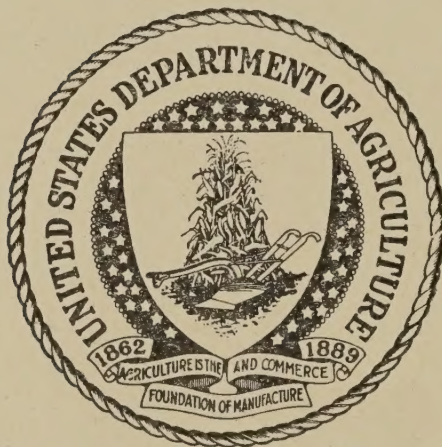


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Agriculture.

No. 3.—MARKET GARDENING.

By A. J. BOYD.

CARROTS.

The best crops of carrots are grown on rich sandy soil which has been heavily manured for a previous crop. Soil treated with rank new manure will not grow good carrots, as they invariably grow coarse and flavourless if the manure is too new. Therefore, if the soil requires enriching, have the manure applied some time previous to sowing the seed, and it ought also to be ploughed deeply to enable the roots to grow long and straight. If the ground is hard underneath, the carrots will fork out, and perhaps growth may take place from the sides of the roots instead of continuing straight downwards.

A good time to sow the main crop of carrots here is in March or April, although with a little care they may be grown all the year round. The soil should be made as fine as possible before sowing the seed, because carrot seed is of a very perishable nature, and the finer the soil is the better is the prospect of its germinating well. The drills may be from 16 inches to 3 feet apart, the latter distance being preferable where plenty of land is available, because the greater distance between the rows will make the work of cleaning and cultivating much easier, enabling most of it to be carried on by means of horse implements. The drills should not be more than 1 inch or $1\frac{1}{2}$ inch deep, and, after sowing and covering in the drills, a light roller should be passed over the ground to break all the lumps in the soil, and also to assist the seed to germinate. When the plants are a few inches high, they must be thinned out to from 3 to 6 inches apart, and after that the only requirement of the crop is that the ground be kept well stirred and free from weeds.

Carrots should be fit for use in from 80 to 100 days after sowing.

There are two distinct types of carrots grown for table use—the Shorthorn and the Intermediate. The former comes to maturity early, and is perhaps the best for small gardens; but for growing on a large scale the longer varieties are the most profitable.

Manure for Carrots: Should the land require manuring, then, following a moderate quantity of dung for the last crop, give from 4 to 6 cwt. of superphosphate and 1 cwt. of sulphate of potash per acre, followed by a top-dressing of 2 cwt. of nitrate of soda per acre after the plants are well up, and, in some seasons, a further 2 cwt. of nitrate of soda a month later.

PARSNIPS.

The culture of the parsnip is very easy, and is precisely the same as that of the carrot. Depth of soil is of primary importance, and new seed should always be obtained, as parsnip seed does not retain its germinating power much longer than a year. To obtain good roots the ground must be either trenched or ploughed very deeply. The seed may be sown in March or April for the main crop, in drills from 2 to 3 feet apart, the plants being afterwards thinned out to 8 or 9 inches. They should be ready for use in about 100 days after germinating.

The most suitable manure for parsnips is the same as is given for carrots.

TURNIPS.

There are many different varieties of garden turnips, but most of them are pretty much alike in flavour and size. The smaller kinds, which are usually either white, reddish, or purplish in colour, are those usually grown

in gardens, the large Swede turnips being, strictly speaking, a field crop, although they are by no means to be despised in the garden, provided there is plenty of room for them.

Turnips succeed best in cool, moist situations, but they may be grown during the winter in many parts of Queensland; some varieties even may be had all the year round, except in the very hottest part of the summer. Well-worked, moderately rich soil will grow good turnips. The drills may be from 16 inches to 2 feet or more apart, and about 1 inch to 1½ inch deep. Thin out the plants to 4 or 6 inches, and cultivate well whilst growing. Turnips are sometimes attacked by aphides, which, if not checked, spread with alarming rapidity, and will soon exterminate a whole field. Spraying with kerosene emulsion or tobacco water, on first noticing the pest, will usually effectually get rid of the pest. The same larva or grub which is so destructive to young cabbage plants, frequently attacks turnips in warm weather, and sometimes a whole crop will be cleared off in a few days by this pest. The best remedy is spraying with Paris green, care being taken, however, that the turnips are not used for some time after spraying.

Manure for Turnips: Bonedust, lime, ashes, and gypsum are good special manures. During dry weather the plants should be watered with diluted liquid manure. If freshly slacked lime is worked into the soil to be sown in turnips, at the rate of 40 to 50 bushels per acre, a month before sowing the seed, the trouble known as "Finger and Toe" will be completely overcome, and the effect of the lime will be felt for some years afterwards.

Turnips may be sown in August, September, and October for a main crop, and occasional sowings may be made during January, February, and March. The best garden varieties are the White Dutch, Early Snowball, Orange Jelly, and Red American Stone. Turnips mature in from 65 to 90 days.

BEETROOT.

Good beetroot may be grown in almost any kind of soil, provided that it is well broken up, and not of too stiff and clayey a nature. Still, the best beets will be produced in fairly rich, dry, sandy loam soils. As in the case of the carrot and parsnip, fresh new manure should never be used for beetroot. If manuring is necessary, it should be done some time before the seed is sown, and be well mixed with the soil. The seed may be sown for the winter crop in February or March, and for the summer crop in August or September; or, by sowing a little every six weeks or so, a constant supply can be kept up all the year round. Sow in the same way as turnips, and thin out to 8 or 9 inches. When thinning the plants, any blank spaces which may occur in the rows can be filled up, as beet stands transplanting well.

There are two kinds of beet grown as garden crops—namely, the Red Beets (which may be either turnip-rooted or long-rooted) and the Silver Beets. Of the former, only the roots are used, chiefly in the form of salads, and of the latter the leaves are cooked as spinach, and make a very palatable dish, especially when other vegetables are scarce. They are very hardy, and will live through weather that would kill almost any other kind of vegetable. For sowing the seeds of all the crops already mentioned, no better implement can be used than a Planet Junior seed drill, which does the work of three men in less time than it could be accomplished by any other means.

Manure for Beetroot: Should the land require manure, a light dressing of dung is desirable, with from 4 to 6 cwt. of superphosphate and 4 cwt. of nitrate of soda per acre, 2 cwt. of the nitrate being applied shortly after the plants are up, and a further 2 cwt. a month or so later. Potash is not necessary when dung is used. A dressing of salt dug in with the manure will be found beneficial, and the fine bonedust or phosphatic manure as stated are highly valued by this crop. Beets may be taken up in 40 days after planting.

RADISH.

Of all vegetables, radishes are the most easily grown, and, next to mustard and cress, give the quickest return, maturing in 40 days. They may be sown at intervals throughout the whole year. In the spring small sowings may be made fortnightly. A light rich garden soil is suitable for them. If sown broadcast, the seed should be covered evenly about $\frac{1}{2}$ -inch deep with soil, and the plants thinned out to about 4 inches apart. The seed may be sown a little deeper in summer than in winter, and in dry weather give the bed a good soaking of water when required, as the plants should be forced to grow quickly and used young.

On all farms and market gardens heaps of manure are to be found crude, fresh, and containing a large amount of heat. This heat can be utilised by market gardeners to get very early crops of radishes in the following manner:—Level down the heaps and extend them as far as they will go, leaving depth enough for some further amount of fermentation. Light free soil to the depth of about a couple of inches should then be spread over the whole, and the seeds promptly sown thereon. They must be well raked in to conserve them from birds. Very fine long radishes may be quickly produced in this way.

Some Good Varieties of Radishes.

Long: Brightest Scarlet, a good French kind; Knickerbocker grows to a very large size, often to 8 inches in length; Iceberg Long White. Semi-long: Chinese Rose; Delicacy, one of the best. Turnip-rooted: Golden Dresden; French Breakfast; Red and White Turnip; New Rocket, which can be obtained both long and turnip rooted.

KOHL-RABI.

The kohl-rabi is a vegetable belonging to the same order as the turnip, but differing from the latter in that the enlargement at the base appears as a swelling of the foot stalks of the leaves instead of the root. There are two varieties, the green and the purple, with large and small leaves. The special advantages of this plant are—its immunity from insect attacks, the great extent to which it resists frosts, its remarkable power of standing frost, and its freedom from mildew. It will stand transplanting better than any of the root crops, which renders it valuable for filling up blanks.

The time for drilling in the seed is August, September, and October, but sowings may also be made in February and March, at the rate of 3 or 4 lb. per acre. The cultivation is similar to that for the turnip. The distance for singling is from 12 to 16 inches, the globe-shaped requiring more space than the oval. As a table vegetable the kohl-rabi is far superior to the turnip.

Manure for Kohl Rabi: The same as for turnips, but land in good heart will require no additional dressing. The plant reaches maturity in 100 days.

LETTUCE.

The lettuce likes a fairly rich soil, and if the soil is not naturally rich make it so with the best manure available, for lettuce, unless rankly grown, is not crisp or sweet. Sow the seeds in boxes or in well-shaded beds, and, when large enough, plant them out in rows 18 inches apart, and the plants 1 foot apart in the rows. They may be planted between the cabbage rows, as they will be ready to cut long before they can interfere with the latter. The cabbage lettuce is the most satisfactory to grow, and is also in most general demand at all seasons. The "Cos" section are loose-growing, and to get them in edible condition the hearts are bleached by tying up the leaves so that the outer exclude light from the inner ones.

A warm and dry situation should be chosen for the winter crops, and one that is low and damp for those of summer. For summer crops sow in August

and September, where the plants are to remain, and thin out to 12 inches. For winter crops, sowings may be made in February and April, and the plants put out in rows the same distance apart.

The Iceberg is one of the best of the cabbage lettuces. Lettuces mature in from 45 to 75 days.

ENDIVE.

Endive is an extremely useful salad, and very easy of cultivation. When lettuce refuses to heart because of temperature, then endive comes in as a valuable substitute. The great secret of success with this plant is to secure perfect blanching by the exclusion of light. Unless the heart is thoroughly bleached, so that the green leaves in the middle become of a pale-primrose colour, the proper end has not been achieved. There is a strong bitterness in the unbleached foliage, which only disappears after being hidden from the light for several days. As endive can be planted 12 inches apart either way, it is called a foot crop, and a small plot produces a quantity of stuff. In bleaching endive, it may be matured by closing the top of the leaves with a strip of fibre, or by laying a flat tile on the plant. The latter method is followed more on the Continent, and, as it excludes light, rain, and air, it produces a like effect to tying up.

Sow in February and March. Rich soil is indispensable if a fine and delicate quality is desired. Endive matures in from 65 to 75 days.

CELERY.

A good, deep, rich, vegetable mould in a moist situation is best suited for celery. For the seed bed or box, make up a mixture of fine loam, leaf mould, and sand. Sow the seeds thinly, cover very lightly, preferably with sifted stable droppings or decomposed manure, and slightly shade them. When the plants are up and the rough leaf is a little advanced, prepare a bed by mixing 2 inches of well-rotted manure with about 3 inches of the soil. Level the surface, water thoroughly, and a few hours afterwards, in the evening, plant out the seedlings 5 or 6 inches apart. Slightly shade them, and then prepare a similar bed for planting out for succession. For the final planting, throw out trenches 1 foot broad and 1 foot deep, at 5 feet apart from centre to centre. At the bottom, lay 4 inches of well-rotted manure, and dig it in with a fork. Give the whole a good soaking with water. Now, take up your plants, being careful to leave a good ball of earth on the roots. Then take a stiff piece of brown paper, and make a collar or case, and wrap it round the lower part of the plant, leaving the top free. As the plant grows, this can be lifted. The object of this is to enable you to heap in the soil against the plants without any of it getting inside them. Keep on drawing the earth up to them to within 6 inches of the top. This must always be done in dry weather. Give plenty of water and occasionally some liquid manure. A little salt sprinkled on the soil once or twice, followed by a good watering, will be beneficial. One ounce of celery seed will be sufficient to plant out an acre. Good varieties are—Cole's Crystal White, Lang's Mammoth Red.

Sow from January to March. Celery matures in 150 days.

ONIONS.

The most suitable soil for onions is a rich sandy loam, free, friable, and easy to work, a soil that will not cake, and not lying so low as to retain the superabundant moisture after heavy rains. In such a case the land should be well drained. An eastern or south-eastern aspect has been proved to be better than if the land sloped to the west, as the onion does not require intense heat to bring it to perfection.

Before sowing the seed, it is important that the seed beds should be clear of weeds and of their fallen seeds. By sowing in April or May there is

not much to fear from weeds; still, it is advisable that the land, both of the seed beds and of the area proposed to be planted out, should be turned up and exposed to the weather for some time previous to sowing. As soon as the weeds appear, give the land a good scuffling, and if this be done two or three times between February and April there will be no trouble afterwards. If the soil be not virgin scrub, or if it has borne crops for many years in succession without manuring, it should be thoroughly well manured with stable dung, ashes, bone dust, &c., as the onion demands plenty and the best of nourishment. New scrub land is rich enough in natural fertilisers not to require any additional manure.

In planting out onions, a very serious mistake is often made, and that is, the soil is carefully worked, reduced to a fine tilth, and the plants are set out in a soil which is loosened to a depth of perhaps 8 inches. From land prepared in this manner no good results need be expected. The onion requires a firm bed; otherwise the plant, instead of making a large well-shaped bulb, will run to neck, and have more the appearance of a leek than of an onion. Therefore the land, before being planted, must be well solidified by rolling.

Onions may be sown broadcast or they may be drilled in, or they may be sown in a seed bed and afterwards planted out in the same manner as cabbages. The best way is to drill them in. In this case about 2 lb. of seed will be required. The seeds must be dropped at a distance of about 2 inches apart in the drills, and the drills should be from 12 to 15 inches distant from each other. The plants will afterwards require to be thinned out with the hoe. When sown in a seed bed, planting out must be resorted to—a tedious process, but one that pays for doing well. On rich soil the plants may be 6 inches apart. The drills should be slightly raised, and the roots of the plant firmly embedded in them. Allow the bulb to, as it were, squat on the surface, not under it. As the plant grows, the soil must be kept perfectly clear of weeds, and, where the working of the ground has thrown the soil against the bulbs, it must be drawn down, so that only the root is in the ground. Where this has not been attended to, the remedy for the resulting want of bulb-formation is to wring the necks of the plants, or at least to bend them down with a twist. This will have the effect of inducing the formation of bulbs. When sowing the seed, care should be taken that they are not covered to more than their own depth. If sown deep, many seeds fail to germinate, and most of those that do appear will make an abnormal growth of neck, causing much labour in drawing away the soil from the incipient bulbs. The writer has never sown onions broadcast, and, therefore, offers no opinion on the value of the method. Of course, more seed would be required per acre, and, if weeds are troublesome, a good deal of hand work would be necessary.

Now, about the seed. There are few seeds so annoyingly deceptive as onion seed, as old seed will lose its germinating power; therefore, make sure of getting fresh seed. After sowing, it should germinate in less than a week.

In former days, large onions were always aimed at, but now the public taste is in favour of medium-sized bulbs, so that closer planting may be adopted.

Spring onions may be taken up for table use in from 60 to 90 days, and the onion comes to full maturity in from 120 to 180 days. They may be known to be ripe by the drying up of the tops. As soon as this happens, take them up by hand and leave them on the ground between the rows to dry, after which carry them carefully, with as little bruising as possible, to the barn.

The principal difficulty in storing onions is their liability to sprout. This must, if possible, be avoided, because whenever growth is set up in any bulb or seed that bulb or seed deteriorates in proportion to the extent of growth. This is why, when onions are pulled, they must be left for a few hours on the ground to dry before being stored. They require constant looking over

to sort out any bad ones, for, as in the case of fruit, a single rotting onion will infect all those in its immediate neighbourhood.

The best varieties to plant are—Mammoth Silver King, which has a mild and delicate flavour. Brown Spanish is an early and exceedingly productive variety. Brown Globe, Silverskin, and Yellow Globe are all good sorts, with good keeping qualities.

Manure for Onions: A light dressing of dung, supplemented by 4 to 6 cwt. of superphosphate, 1 cwt. of sulphate of potash (or 4 cwt. of kainit), and 4 cwt. of nitrate of soda per acre.

Potash is of vital importance to onions, and should on no account be omitted.

LIME AND ITS APPLICATION TO THE SOIL.

Lime is very extensively used as a fertiliser, but its action is not generally well understood, and serious mistakes often occur from its indiscriminate use. Most soils contain all the elements of plant food in varying quantities, but, however abundant the presence of most of these essential constituents, if any one of them be absent the soil is perfectly barren, and if present in insufficient quantity the resulting crops are unsatisfactory to the extent of that deficiency. Lime cannot be classed among these deficient substances, for, although it enters into the composition of almost all forms of vegetables, life, its various compounds are so widely and generally distributed that it would be a very rare circumstance for any sample of ordinary soil to be found on analysis not to contain sufficient lime for the requirement of any cultivated plant. Then it may be asked, How is lime a fertiliser? Anything is a true fertiliser which causes a plant to make more vigorous growth and yield better crop; and lime does this in a twofold manner—viz., chemically and mechanically. First, as to its chemical action. All plant food to be available must be in a soluble condition, otherwise it is like human food under lock and key. All soils contain animal and vegetable matter in varying proportions and in various stages of decomposition. Now lime, in its caustic condition, is one of the most powerful agents of decomposition, and where, from defective drainage or other causes the land is “sour,” and where organic matter does not readily decompose, the application of caustic lime often works wonders, causing these previously inert substances to yield an abundant supply of available plant food. Probably this use of lime and its compounds sometimes reacts with injurious mineral substances, producing useful or harmless compounds—for instance, the action of gypsum on carbonate of soda. The mechanical action of lime on heavy clay lands is an important aid to fertility, causing the soil to become friable, and thereby giving free access to air and water. This mechanical action is shared by several of its compounds, such as gypsum, powdered chalk, pulverised shells, &c. The common mistakes in the application of lime as a fertiliser are the following:—When its chemical action is required on sour, boggy land, it should be spread and ploughed in as soon as possible after being slaked. It is often allowed to lie in heaps for weeks and months, when it absorbs carbonic acid from the atmosphere, and becomes gradually converted into carbonate of lime or chalk. When spread and allowed to remain for some time before being ploughed in, the mischief is still greater. Considerable damage sometimes occurs from over-liming. Since caustic lime greatly promotes decomposition, there is danger of bringing too large a proportion of plant food into available form, resulting in a heavy crop in the ensuing season and comparative barrenness for several years after. It is a common practice to add lime to nightsoil and other animal manures. Caustic lime sets free the ammonia, thus depriving the manures of one of its most valuable constituents.—“Mexican Investor.”

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE,
GATTON.

RETURNS FROM 1ST TO 30TH NOVEMBER, 1907.

Name of Cow.	Breed.	Date of Calving.	Yield of Milk.	Babcock Test, Per cent. Butter Fat.	Commercial Butter.	Remarks.
			Lb.		Lb.	
Whitefoot ...	Holstein-Sh'rth'rn	28 Sept., 1907	773	4·4	38·09	
Reamie ...	"	Oct. "	713	3·8	30·34	
Careless ...	Jersey ...	20 Oct. "	624	3·8	26·55	
Dot ...	Shorthorn ...	20 Oct. "	558	4·1	25·12	
Sue ...	Grade-Shorthorn	22 April "	513	4·2	24·13	
Pee-wee ...	Holstein-Sh'rth'rn	6 April "	542	3·9	23·67	
Chocolate ...	Shorthorn	5 Mar. "	551	3·8	23·45	
Honeycomb	"	23 Aug. "	538	3·8	22·89	
Conceit ...	Ayrshire ...	28 Oct. "	547	3·7	22·66	
Bliss ...	Jersey ...	17 Sept. "	461	4·3	22·20	
Lass ...	Ayrshire ...	19 April "	489	4·0	21·90	
No. 112 ...	Grade-Jersey ...	19 April "	592	3·3	21·88	
College Lass	Ayrshire ...	14 Sept. "	511	3·8	21·74	
Dora ...	Shorthorn ...	9 Sept. "	495	3·9	21·62	
Night ...	Holstein-Devon	28 May "	497	3·8	21·15	
Gem ...	Shorthorn ...	29 Aug. "	514	3·6	20·72	
Wonder ...	"	7 Dec., 1906	464	4·0	20·78	First calf
Laura ...	Ayrshire ...	20 May, 1907	535	3·4	20·37	
Dripping ...	Holstein-Sh'rth'rn	28 Nov., 1906	479	4·0	21·45	
Mona ...	"	Oct., 1907	475	3·8	20·21	
Restive ...	Shorthorn ...	21 Aug. "	473	3·8	20·13	
Daisy ...	Holstein ...	30 Aug. "	493	3·4	18·77	
Nettle ...	Shorthorn ...	17 May "	466	3·3	17·22	
Patch ...	Guernsey-Sh'rth'n	Sept. "	491	3·0	16·49	
Dewdrop ...	Holstein ...	24 Mar. "	487	3·4	18·54	First calf

The cows were fed on 20 lb. of ensilage per cow per day, and allowed to graze on cultivation fields for two hours daily.

DAIRY NOTES.

Five pounds of skim milk is as good as 1 lb. of maize meal for feeding pigs.

On comparatively few farm dairies are milk records kept. This is unfortunate.

English farmers have for generations made extensive use of Dwarf Essex forage rape as a stock food.

Rusty cans and those with rough seams are very difficult to clean, and in bad cases only live steam or prolonged scalding will make them pure.

The length of time a cow will maintain her production depends on her constitutional strength and the care with which she is managed.

A good dairy cow should not show any marked falling off until after ten years of age.

A cow is at her best during the fifth and sixth years, up to which time the production of milk and butter fat by cows in normal condition increases.

It is well known that the farmers who are the most successful are those who make a specialty of dairying. This is due to the fact that the market is always ready for milk and butter.

Subsequent to the weaning period, calves are frequently allowed to lose in flesh, thus in a measure losing the benefit that would otherwise result from careful feeding during the milk period.

After a certain age has been reached—on the average seven years—the food required for the production of milk or butter fat again increases, both as regards dry matter and digestible components of the food.

Never before has so much attention been directed to the subject of securing pure milk under sanitary conditions for consumption in the big cities. Dairymen and farmers generally welcome this movement.

Dairy farming at present is a manufacturing industry that requires a very high grade of intelligence, the closest watching of detail, and the conscientious performance of duty, if success is to be attained and maintained.

Young animals use a portion of their food for the formation of body tissue, and it is to be expected, therefore, that heifers will require a larger proportion of nutrients for the production of milk and butter than do other cows.

There are two classes of bacteria that bring about souring. One produces a clear sour flavour; the other produces sourness, accompanied by gas, with which is usually associated a flavour varying from not quite clean to rancid.

The quality of milk produced by heifers is somewhat better than that produced by the older cows, for a decrease has been noted of one to two fifths of 1 per cent. in the average fat contents of each year until the cows have reached the full age.

A good milking cow of exceptional strength, kept under favourable conditions, whose digestive system has not been impaired by over-feeding or crowding for high results, should continue to be a profitable producer till her twelfth year, although the economy of her production is apt to be somewhat reduced before this age is reached.

It is possible for a farmer to keep twice as many cows when he makes a large profit, because he can incur greater expense in purchasing food, and thus enrich the farm with manure; but what is better, the farmer can more than double his profits with the same number of animals by using those that produce twice as much milk and butter as the common kinds.

The stomach of a cow recently killed in the Koroit district, Victoria, contained 4 lb. of quartz, a quantity of large bones, numerous pieces of glass of different shades, a number of the brass parts of cartridge cases, nails, fencing staples, lead, sandstone, sea shells, clothes buttons, and plated sleeve links. The buttons had apparently been attached to garments which had been eaten and digested.

Ropy milk contains a bacteria which causes the milk to become ropy. This bacteria is found in some waters. Therefore, milk pails, strainers, and vessels should be washed and scalded before being used, and no cold water put into the vessels after they have been scalded. The udder and flank of the cow should be washed before each milking with a solution made by mixing 1 part borax to 30 parts water.

The Tantaloola correspondent of the Millicent (South Australia) paper writes:—A cow belonging to Mr. E. Pepper died a few days ago, after a short illness, and as she was in fair condition the owner thought it advisable to hold a *post-mortem* examination. He found that the stomach contained a quantity of brass tacks, hob nails, sprigs, and screws from the plates of heavy boots, a piece of a cockatoo chain, nails about 2 inches long, and two pieces of solder. The cow had always appeared in good health.

“It is now recognised and acknowledged by all experts and leading butter-makers throughout the world that in the manufacture of high-grade butter starters are indispensable,” says Mr. Shirley, Government Instructor of New Zealand, “and I will say that the butter-maker who is working under ordinary conditions and omits their use is behind the times and incompetent. In the preparation of starters the one important point is to have them absolutely free from undesirable bacteria. Therefore, it is essential that a special

room and equipment that can be kept free from any source of contamination should be provided for this purpose, that all appliances and utensils used in this connection should be free from rust or broken surfaces of any kind, and thoroughly cleansed and sterilised with live steam."

A Queensland farmer a few years ago described the method he employed to ascertain whether a cow were in calf or not. He used to milk the cow into a bucket, and, having a glass of pure water at hand, dipped a straw into the milk and allowed one single drop to fall into the glass of water. If the milk mingled with the water, rendering it cloudy, the cow was not in calf; but if the drop of milk sank to the bottom before mixing with the water she was pregnant. This test had been used for years, and was never known to mislead. The test was based upon the idea that the milk of a pregnant cow is more viscous than that of a cow which is not in calf, and thus the single drop allowed to fall into the water betrays the condition of the cow by the greater or less tendency with which it holds together.

The chief points (says the "Live Stock Journal") to be looked for in a good Hereford are—first, that the colour should be a distinct red, not too dark or too light; white face and mane, also white breast and belly, and white legs as far as the knee and hock, sometimes running up the flank. The bull should have a good masculine head, not too long, broad between the eyes, which in turn should be large and prominent, with a mild look denoting docility of temper; the horn should be of moderate length, springing straight from the head. The cow's head should be much the same, but finer, and her horns should have a curve, and turn upwards slightly; they should be in both cases of a waxy white, although they are occasionally found tipped with black; the nose should be of a pure white or flesh colour. The bull should have a good rise of crest, deep sloping shoulders, well-developed brisket, straight back and belly line, wide loin, good springing ribs, moderately broad hips, tail well set on, and falling on a plump line to the hocks. The hindquarters should be long from the hip backwards; the thighs, which are a very important point, should be large and full, showing plenty of width across when you stand behind, and they should be well meated to the hocks. The test of touch is difficult to describe, and can only be learnt by practice.—"Warwick Examiner."

LAMBS FOR EXPORT.—A FARMER'S OPINION.

There is much divergency of opinion as to the best cross for producing lambs for export purposes. Many favour the merino ewes with Shropshire or South Down rams; in fact, this has been the most common cross. A South Australian farmer, Mr. M. Rankin, recently published his experience on lamb-breeding, extending over a period of twenty years. He strongly favours the Lincoln-Merino ewe crossed with one of the breeds above mentioned. The ewes, he states, "are larger, quieter, and better mothers than the pure merino, and when too old for breeding were good butchers' sheep. The merino is small in carcass, heavily woolled, of a roaming disposition, and not inclined to put on fat when young. He had no trouble with crossbred sheep breaking bounds, as he made it a practice not to overstock. True, their wool was not of equal value to the merino, yet by care and attention it can be greatly improved. As a matter of fact, however, they could not get both fat and wool of the finest class on the same animal when young, and for lamb-breeders the sheep that put on fat instead of wool was most profitable. For the London market he had a strong preference for the use of Down rams, as the progeny matured earlier than the Shropshire cross. The Dorset Horn had come to South Australia of recent years, and, while he could not speak from personal experience, the crossbred lambs he had seen at the Roseworthy College led him to believe that this breed might prove the best of all for the lamb-breeders, as the lambs were fit for market at ten weeks to twelve weeks old.

Poultry

MANAGEMENT OF CHICKENS.

After the chickens have made their exit from the shell, it is not necessary to feed them for the first twenty-four to thirty-six hours, because immediately prior to hatching they have absorbed the yolk sac into their stomach, and this contains sufficient nutriment to sustain them for the period just mentioned. At the end of this time they should be removed from the nest, if they have been hatched under a hen, or from the drying-box when an incubator has been employed, to the coop or the brooder, as the case may be. The first feed should consist of hard-boiled eggs chopped up fine and mixed with breadcrumbs or biscuit meal. We rather prefer the latter, as the breadcrumbs are more liable to cause the chickens to scour. Eggs may at first sight appear a somewhat expensive food for chickens, but new-laid eggs need not be used for this purpose. The infertile eggs, that have been tested and rejected on the seventh day, may be used, as they do equally as well for the birds. Later on in the season, when eggs are very cheap, then ordinary new-laid ones may be used, but earlier either the infertiles should be used or else shop eggs. The eggs and biscuit meal should be slightly moistened with water or fresh skim-milk, but only moistened, and not made in a sloppy state. This diet should continue for the first three or four days, when the eggs may be discontinued, and the biscuit meal form the staple food. There are several excellent meals upon the market, and they have the great advantage of being cooked foods, so that it is only necessary to moisten them with water and they are ready to give to the birds. One of the great secrets of success with regard to the rearing of chickens is variation in feeding. It is most unwise to give the same food time after time, until the birds are bound to tire of it, however good and wholesome it may be. If the food is varied the chickens will eat with much greater relish, and as a consequence, if suitable foods are fed, the chicks will grow more rapidly and will attain a larger size than would otherwise be the case. A mixture of barley meal and toppings in equal proportions also forms a good food, and this should likewise be moistened with water, and made into the condition of what is called crumbly moist. Boiled rice is also beneficial, but it is almost useless feeding it raw, but should be cooked. When supplied to the chickens raw it passes through them very quickly, and is not properly assimilated. The correct way to prepare it is: To 1 pint of chicken rice add 3 quarts of water, and allow this to simmer—not boil—until the rice has absorbed all the water. It is a wise plan to put a little bone meal in as well, as this helps to build up a good frame. Another excellent food is oatmeal, and this should be well soaked in hot water, until the oatmeal is well swollen out, and it should then be partly dried up in barley meal or toppings. As soon as the chickens are old enough, generally at the end of a couple of weeks, they should be given some small grain, and for this purpose dari and buckwheat are very useful. Buckwheat is a grain that is not much used in this country, but it is extensively employed on the Continent, especially for feeding chickens. It is a small grain, and of a reddish-brown colour. Cracked wheat is also a good food for chicks, but it should only be cracked, and not ground up so as to be at all floury.

It is a very debatable point as to whether chickens should be given water to drink during the first few weeks. Chickens with a hen, of course, must be supplied with some, as they will drink with the mother; but with regard to artificially hatched chickens we think they are all the better without water for the first three weeks or a month. The food being given to them well moistened supplies them with sufficient, and we have always had better results with not

allowing them water to drink. On the other hand, there are breeders who always give water to the chicks, so that everyone must judge for him or for her self. The important thing is that, should one select to give water, then see that there is always a plentiful supply before the birds, because if the water dish, as is sometimes the case, is allowed to get dry and remain so for a few hours, when fresh water is given to the birds they, being very thirsty, will take a long drink, with the result that frequently liver trouble is brought about.

Chickens, if they are to be successfully reared, must have an abundance of fresh air, and one of the most fatal mistakes that can be made is to coddle the birds. Infinitely more chickens die from coddling than from exposure, and, although we do not advocate that the birds should be kept in a cold place, we do not think there is any danger in letting them run out when the weather is cold, as long as they have a warm place in which to go. Damp, of course, is another matter, and it is necessary to see that when the weather is wet plenty of good shelter shall be afforded for the birds, so that they need not go out into the open. For this purpose a double coop is very useful, and by a double coop we mean a coop to which there is a run attached. It is better placed at the side than in front, and for early work a coop of this description is almost necessary. It has a further advantage in that the chickens can be fed in the run, and the other birds running about the place and the mother herself cannot get at it. It is very annoying to find when some special food has been prepared for the chickens that the other birds are eating it, and hence a double coop would save this annoyance and loss. The coop or the brooder, whichever is employed, should be removed on to fresh ground every day, as nothing taints the ground quicker than do chickens, and should the ground become at all foul disease is certain to follow. It is never a wise plan to use the same piece of ground year after year for the rearing of chickens, because the ground so soon becomes tainted, and upon tainted ground it is absolutely impossible to successfully rear chickens.

Green food in one form or another must be given to the birds, as this is necessary to keep their systems in right order. When they can be procured, lettuce leaves are one of the best forms, but as a rule this is rather too expensive to feed to chicks. Garden refuse, such as cabbage leaves, is useful, and also onions. Onions should be given once every day, and the best way to give them is to mix with the food, having chopped them up into fine pieces beforehand. Nettles are also beneficial, and these have the advantage of keeping the blood in good order. Grit, too, must be supplied to the birds in order that they may properly masticate the food. Fowls have no teeth, and the grit has to answer the same purpose, the food being taken down into the crop, then on to the gizzard, where it comes into contact with the grit, and is ground up, so that it can be properly assimilated. By attention to detail and by treating the chickens in a common-sense manner, it will not be found a very difficult matter to rear them successfully, but care has to be exercised with them, and it is essential that all the details shall be correctly attended to.—“Agricultural Gazette.”

The Horse.

CURES FOR BOTS.

The bot fly generally lays its eggs on the flanks of a horse or under the chin, almost always in spots, however, which the animal can reach with its tongue. Various suggestions have been made as to the best means to destroy the eggs. One grazier says that the simplest way is to strike matches and lightly burn the hair from the egg-infested patches without hurting the horse. To get rid of the worms inside, it has been shown by a German professor that a dose of tansy tea, followed a few hours later by half an ounce of salts, is a certain cure, hundreds of worms being passed by this means. Regular grooming would probably remove the eggs, but thousands of horses never get any grooming, and all that can be done with these is to try the match business or wash the parts with dilute carbolic acid or kerosene, or dose with tansy tea.

The United States Department of Agriculture lately described some tests upon a quantity of live bots taken from a horse which had been killed by them. Put into sage tea, they died in fifteen hours. This being too slow, they were tried with nitric acid, but that seemed to trouble them no more than water. Then they were put into an infusion of tansy; that killed them in one minute. A horse suspected of being troubled with bots was given some tansy tea in the morning and a dose of salts in the evening. The next morning the horse's excrement contained $1\frac{1}{2}$ pint of the bots, and the cure, after repeated trials, is now said to be recognised as thoroughly effective.

The Orchard.

PRESERVING FRUIT IN NITROGEN DURING SHIPMENT.

At the Paris Exhibition of 1900 there was exhibited a case of fish that had been preserved in nitrogen for seven years without decaying. Reading of this, Mr. Elwood Cooper, State Horticultural Commissioner of California, was impressed with the idea that if a suitable container could be furnished at a low cost the nitrogen could be profitably used in preserving Californian fruits during shipment to foreign markets. As a result of considerable experiments, Mr. Cooper has now succeeded in producing such a container. It consists of a paper box treated with bitumen to prevent the entrance of oxygen from the outside atmosphere. After the box has been filled with fruit it is closed, except for a small opening. A number of these filled boxes are placed in a steel cylinder from which the air is exhausted. Then the cylinder is filled with pure nitrogen gas, and by means of an automatic device the boxes are sealed. Peas, grapes, cherries, and many other fruits so treated were found to be perfectly sound at the end of five months, and in the case of some damaged fruit it was seen that all decay had been arrested by the nitrogen, only the spots affected when the fruit was encased remaining without spreading to the rest of the affected fruit.

Tropical Industries.

COTTON-GROWING IN QUEENSLAND.

REPORT OF MR. D. JONES.

In October last, Mr. D. Jones, Cotton Expert of the Department of Agriculture, made a tour through the Wide Bay and Burnett and Central districts, with a view to inquiring into the possibilities of cotton-growing in those districts. He spent about six weeks on the trip, and on his return reported as follows to his Department:—

Leaving Brisbane on 7th October, my first inspection was among the farmers situated on the Kilkivan line as far as Kingaroy. I found that plots were either being sown or were already in the ground, varying from 1 acre to 5 acres. These were in nearly every case the first attempts of the settler at cotton-growing, hence information as to procedure was warmly accepted. I found in many places in this region that the shrub got severely frosted in winter, which prevented its utilisation for more than one season. In places where frost range was limited to the low lands, the shrub could with safety be left for stand-over or pruned crop. On the Kilkivan line I visited Goomeri, Murgon, Wondai, Kingaroy; all these places have large areas of good soils well suited for cotton. In a few instances growers were able, by reason of former experience in cultivating cotton, to be in a position to speak favourably of the advantage of cotton-growing. Taking advantage of train delay, I visited Nikenbah, on the Pialba line, and had an opportunity of observing the growth of some tree-cotton, which had been formerly brought under my notice.

On 12th October I left Maryborough for Gayndah. In company with Mr. Barber, I visited the group settlement. Here several of the farmers had made preparations for sowing when rain fell. This crop should be a very profitable one for the group settlers. At Biggenden I found growing in the Dillarnil Scrub some Caravonica cotton, the seed having been bought from Dr. Thomatis. This variety grows most profusely in any region out of frost reach, bearing for the most part of the year a very excellent quality of fibre. This species of cotton shrub has been in existence in many places for the last forty years, thus has become thoroughly acclimatised, and is a variety which is well worth attention, particularly in the tropical regions of the State. The dairying industry is fast becoming a popular one with settlers in the Wide Bay and Burnett districts. This, combined with the attractions of sugar-growing, will for a time be a factor that will militate somewhat against a very rapid extension of cotton-growing, particularly while juvenile labour is as difficult to obtain as at present. The greater part of my time was given to matters connected with the industry in the Central district, west of Barcaldine, beginning my first investigations at Tanby and Yeppoon, on the coast. Here I found the tree variety to which, after conferring with the growers, it was agreed to give the name of Mascotte, to distinguish it from other types growing at various places. This Mascotte variety, which is growing self-sown in great vigour, and annually producing from 2 lb. to 3 lb. of fibre in seed (in instances much more), is to be seen flourishing on the roadside and among the scrub, heavily laden with ripe fibre, uncared for and ungathered. The market value of this class of cotton seed, being at present about 2d. per lb., by reason of its large yield should attract juveniles and unemployed, who might pick it for sale.

Stanwell and Capella are the chief centres in the region where this crop is produced on a commercial scale. At Stanwell, the tillage of this crop has been in vogue for some years past, mainly through the efforts of Mr. G. Sanderson, who has been active in furthering the interests of cotton-growers in the Central district. The returns per acre for Upland varieties have been about £8. This

might have been augmented had the tillage and gathering been closer attended to. Many farmers there, particularly those who have observed the yield of the Mascotte type, favour the cultivation of that class, a proposal which, in my opinion, has much to recommend it. To those proposing the cultivation of this variety I have made the suggestion that Mascotte be sown in 8-foot distances each way, the intervening spaces sown to the dwarf Upland sorts. The result will be that an Upland crop will be taken off in six months, then at the end of another six months the tree-cotton will come into profit. This system will meet the needs of the farmer who is dependent on an early crop for his livelihood. The Mascotte, once established, will give an annual crop for many years without further replanting. In several instances under notice these shrubs were known to have borne for ten or fifteen years in defiance of drought. At Stanwell attention will be given to both these varieties, and some extended area will be sown. The cotton grown in this district has been principally Upland of good quality, the whole of which has been ginned by Mr. Sanderson, using for the process a McCarthy double action roller gin. Some of this fibre was sold to local buyers at a very satisfactory figure; a portion of the crop is, I understand, on its way to Liverpool to test the range of the British market.

At Capella considerable interest is aroused by reason of Mr. Willis Hargrove, an American cotton-planter of wide experience, having, after much investigation, selected this district as in his opinion best fitted for this pursuit. Mr. Hargrove, at the period of my visit, was engaged in preparing land for crop. Arriving in the locality rather late, his area will for this reason be a more restricted one than originally contemplated. At most he will from appearances be unable to sow this season more than about 10 or 12 acres, quite a sufficient area to determine the suitability of the district for cotton. Other farmers in the neighbourhood propose to sow plots of Upland and Sea Island varieties. The soil in this locality is a chocolate loam of great fertility. The feature of the land is open downs, lightly timbered—in fact, ready for the plough. Mr. Hargrove considers his prospects much more favourable than any yet experienced in America, and is very sanguine of turning the cultivation of cotton to advantage. At Bogantungan last year some very excellent Upland cotton was grown, samples of which were very highly valued by the British Cotton Growers' Association. This seed had been lost. My visit was necessary to recover, if possible, the variety. This I was fortunately able to do, with the result that some of the seed was distributed to many farmers in the Central district and elsewhere.

At Barcaldine I found both Upland and Mascotte varieties growing well. Several experimental plots will be grown as the results of my visit. Spring-sure and Gindie were visited. At each of these places farmers were interested in the crop. At Gindie some shrubs were growing uncared for, which had been in existence before the great drought, and were at the time of my visit masses of fibre. The result of my visit to these districts has been that a previously expressed opinion has been confirmed, and is that in the Central district there are thousands of square miles of country eminently suited to grow either long or short staple cotton in abundance. During my visit I did all in my power to interest such commercial men as well as farmers with whom I came in contact with a view of removing the prejudices which unfortunately exist, as well as present facts based on experience to hand. Fortunately I was able, by reason of our Southern experience, to indicate what profits would accrue, and also remove some misapprehension as to the cultivation and labour conditions connected with this vocation. In the object of my visit I have been ably assisted in the Central district by the "Morning Bulletin" and "Daily Record," Rockhampton, both papers having given extended notices of my visit and movements, and in other ways warmly espoused the purpose of cotton production. The Rockhampton Pastoral and Agricultural Society, at my suggestion, have resolved to establish a registry to meet the wishes of landowners who propose to cultivate cotton but are unable owing to the absence of cotton-pickers.

Several of the sheep and other farmers intimated their willingness to add to their pursuit that of cotton planting, providing families can be induced to migrate to their localities and take the cotton off on the share principle so much in vogue in America. The basis of agreement as suggested is a fairly liberal one, ranging from 8s. in the £ to halves. This establishes at once a sound basis on which to engage in cotton culture. Taking 8s. in the £ as a basis, the family picking would reap a return of £2 8s. to £3 4s. per acre, based on a moderate crop of Upland cotton to range from £6 to £8 per acre. If a half-share agreement operates, then the profit to the harvester is larger. This is briefly a proposition advanced and approved of by several farmers who ardently wish for an influx of population into their sparsely populated territory. The tour has been of much practical service, not only in calling attention to the value of this industry and familiarising prospective growers with its culture, but a further advantage has accrued in experience gained of the behaviour of different varieties under divergent climatic influences, which will eventuate in a better knowledge generally of the habit of the plant. My visit, covering as it did so large an area of country, was of necessity hurried, and sufficient time was not available to give the requisite investigation in certain localities. I would suggest the Department give me an early opportunity of visiting the region around Miriam Vale to Bororen, on the Rockhampton line, where some very excellent specimens of cotton were given me, and which need identification.

Three fresh varieties were observed at Capella, Clermont, and Gindie, seeds of which have been distributed among various growers, so that evidence of their value may be to hand during the coming season. In this report I have of necessity but briefly summarised interesting points of my visit, which indicate that a huge territory admirably adapted to produce the finest of cotton is now awaiting the advent of population to utilise its resources. I wish to record the valuable assistance rendered me by Mr. Lyons, secretary of the Rockhampton Pastoral and Agricultural Society, which materially helped me in my work. During this trip I travelled by vehicle 102 miles, by rail 2,207 miles, and by bicycle 225 miles, having left on 7th October and returned on 16th November.

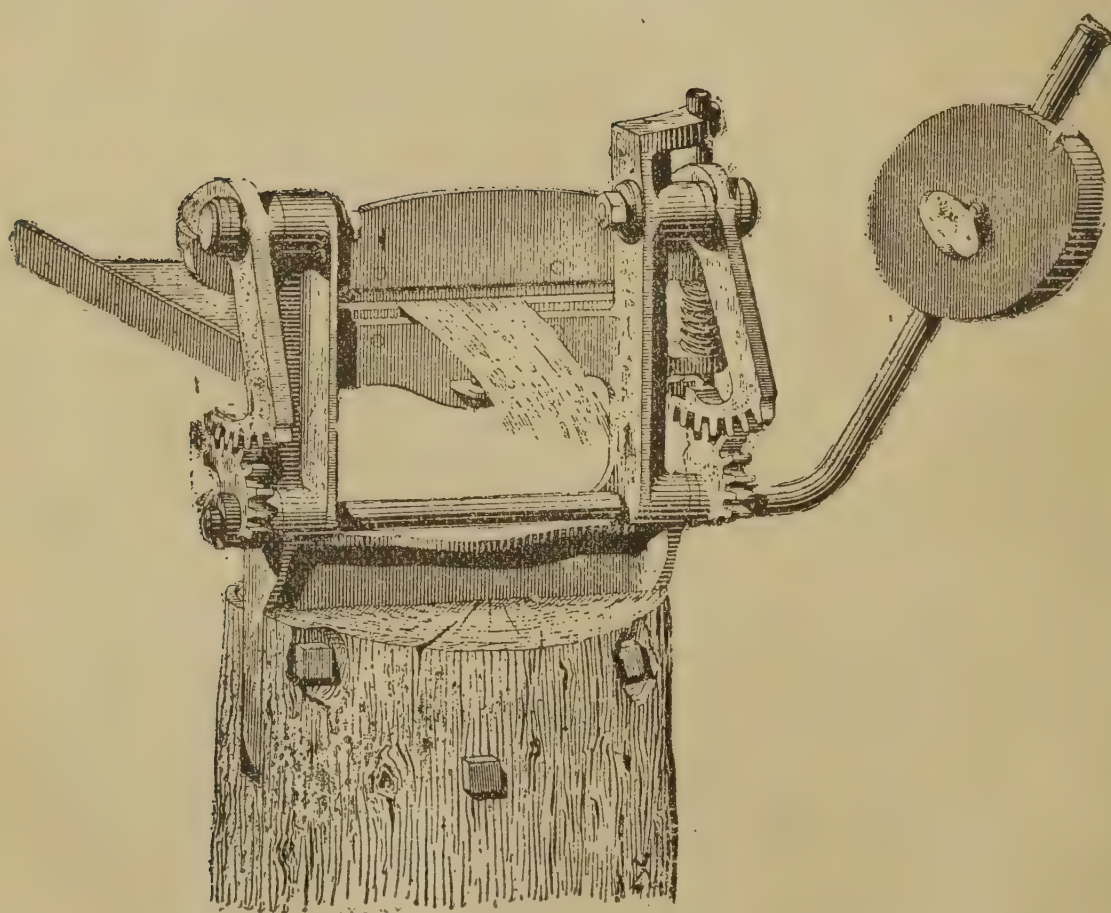
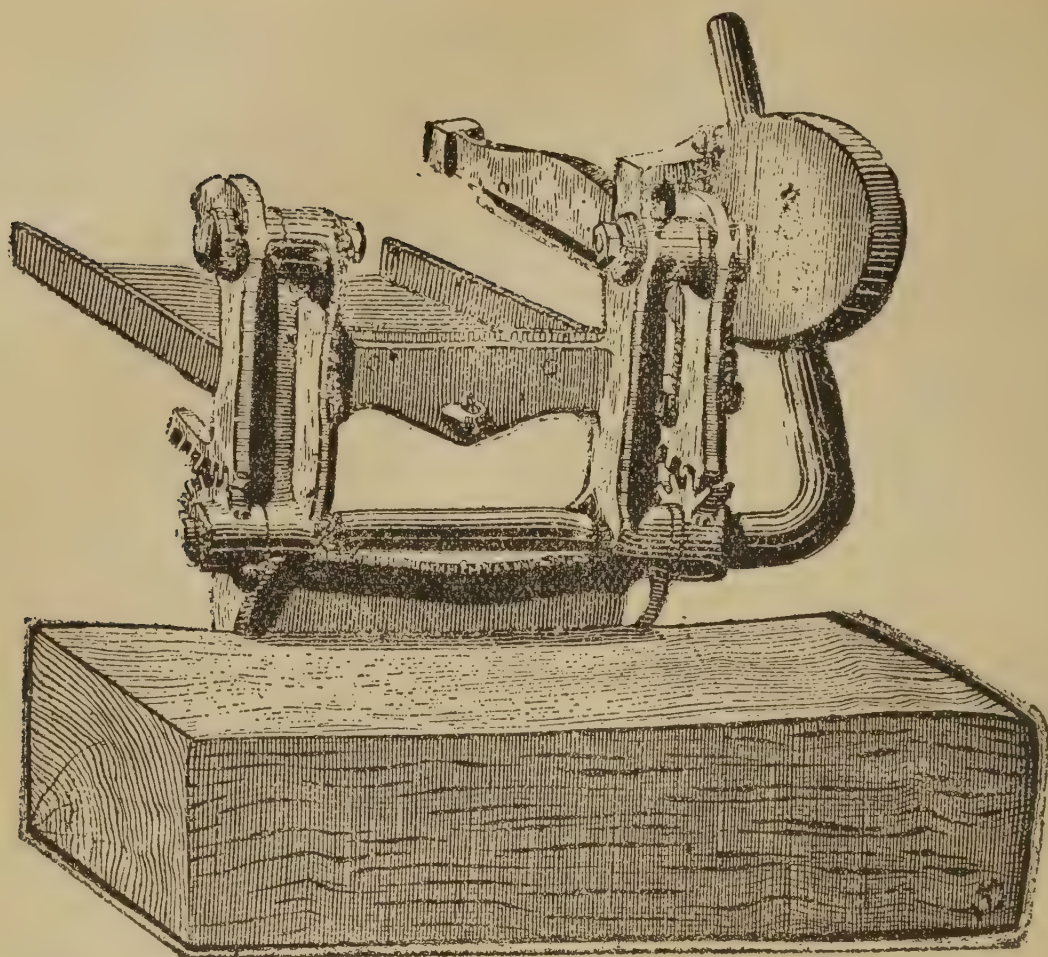
EXTRACTION OF BANANA FIBRE.

Manila hemp, which is a product of the member of the banana family known botanically as *Musa textilis*, is, so far, the only fibre extracted from the banana which forms a valuable article of commerce. But it is well known that the stem of the ordinary banana plant, such as the sugar and Cavendish bananas and the plantain, contains a large quantity of excellent fibre, which, in this country of dear labour, it will not pay to extract unless some suitable machinery is available for the purpose. Hitherto there have been no such machines on the market, and those which have claimed to be able to carry out the work expeditiously and cheaply have lamentably failed to fulfil the conditions.

A machine has lately been invented and patented in France for the extraction of banana fibre, for which the inventor claims that it will do the work to perfection, and that at a very low cost for labour. The price of the machine is only about £5, and it is said that it will turn out about 65 lb. of clean fibre in a day.

It is called "The Défibreur (Fibre Extractor) Duchemin," and is the invention of Mr. Eugene Duchemin, one of the most experienced agriculturists in Tonquin.

Whether such a machine as here illustrated could be worked to a profit in a country like Queensland, where the labour conditions are such as to prohibit the profitable working of hand-power machines, is open to question. There is no doubt that thousands of tons of valuable marketable fibre are annually left to rot on the banana plantations, when the stems are cut down after they have



borne their bunch of fruit ; but as no machine has yet been invented by means of which the fibre could be expeditiously and at the same time cheaply extracted a valuable exportable product continues to be wasted, and we cannot think that

a machine such as is here described will solve the problem. During the course of the year, however, the matter will be put to a practical test, as a machine has been ordered for Captain Hamilton, a planter at the Solomon Islands, who intends to try what can be done in the way of extracting banana fibre by this means.

For the extraction of banana fibre, the installation consists of three extractors, one slicer, and one pulper, the whole costing only 112 francs (£4 13s. 4d.), and weighing 11 kilos, a little over 24 lb. To work the five machines, three men, one woman, and a boy or girl are employed, and their united efforts result in the production of 30 kilos of fibre for the day's work (65 lb). Now, if we value the best fruiting banana fibre at £20 per ton, the day's work would be worth about 11s. 7d., and, since black labour can be obtained in New Guinea and in the Solomon Islands at 4d., 3d., and 2d. a day for men, women, and boys respectively, the cost of producing 65 lb. of fibre with the machine under notice would only amount to 1s. 5d., or at most, with native food, 2s., leaving a clear profit of 9s. 7d. per day, or £2 17s. 6d. per week. At this rate it is apparent that the greater number of machines used, the greater the profit in countries where such cheap labour is available. The only way in which the machine could be profitably utilised in this State would possibly be at the aboriginal mission stations, or perhaps by the Chinese banana-growers.

It is claimed for the machine that it will extract the fibre of pineapples, *Sansiviera*, and aloes, as well as that of bananas.

PLANTING POSSIBILITIES IN PAPUA.

The following very interesting report on the Barodobo Plantation at Rigo, in Papua, was kindly furnished to us by Mr. A. C. English, the proprietor:—

I have much pleasure in replying to your request for particulars of the Barodobo Plantation, which is situated about $1\frac{1}{2}$ mile inland from the coast at Kapa Kapa. The area is freehold property of about 226 acres. Out of this there is about 70 acres planted with rubber (*Ficus Rigo*), the indigenous rubber of this district—about 12,000 trees. The youngest trees are about four years old, and about 50 acres from about five to nine years old. In addition to this, there are about 15 acres of cocoanuts coming into bearing, 70 acres of sisal hemp, the greater part over two years old, and will soon be ready for harvesting. Experiments have been made with a few acres of Arabian and Siberian coffee; although it thrives very well during the wet season, the rainfall is not sufficient to ensure its success as a marketable product. A similar experience with cocoa. About fifty trees of the rubber *Ficus elastica* have been planted, and have been found to thrive most vigorously, and the surrounding district is well adapted for it. Several kinds of cotton have been tried with great success. A small parcel I am forwarding from the kind known as Kidney cotton. Sea Island, China, and India varieties, also American, have grown well. Kapok also grows well. Some of the trees grown from seeds imported from Java have obtained a height of over 60 feet in nine years. The cotton has been reported upon by experts as first class. Turmeric, arrowroot, ginger, and peanuts have been grown successfully, but no attention has been paid to them. There is also one fine specimen of China tea, which seemed to thrive well. Most of the tropical fruits do well, and many are to be found on the plantation.

European vegetables, such as tomatoes, beans of all kinds, cucumbers, cabbage, radish, lettuce, egg-plant, eschalots, beetroots, turnips, &c., all grow well during the wet season, and I am of opinion that most European vegetables will grow well on the inland river banks, and would well pay a planter to keep a garden for this purpose.

Poultry, such as fowls, geese, guinea fowls, ducks, pigeons, all thrive well. Maize during the wet season gives an abundant crop, and it is possible

to get two crops per year, thus reducing the cost of keeping poultry to a minimum. Millet and sunflower—excellent food for poultry—also grow well.

Cattle, such as oxen, goats, pigs, horses, thrive very well, fodder and food being plentiful. Sheep have been tried and bred here, but have been found to get so fat, and the wool grows so fast, that we think the heat was too much for them. Other kinds with lighter wool, such as the Java sheep, we believe, would do well.

Referring back to the rubber *Ficus Rigo* and sisal hemp, the former is a very hardy tree, thrives well, easily grown from cuttings. Numerous plants are obtained from the surrounding scrubs, where they are found in the form of parasites. Most all wild and domestic birds and animals feed on the figs, thus carrying the seeds in all directions; being passed through the bowls of birds, the seed germinates in the limbs and forks of trees. The roots find their way to the ground, eventually strangling the foster mother, and become a fine tree. There are other instances of seed having germinated at the foot of large trees after a fire or heavy rains. It is quite easy after a few acres of this valuable tree are planted to extend the area. The lower limbs usually throw aerial roots, like most of the *Ficus* family, and in favourable weather we have cut off these limbs with 3 and 4 inches diameter, planted them out, and soon have become trees which would take two or three years to obtain the same dimensions as if planted from ordinary cuttings. Seed has been planted, but we have been unable to get it to germinate. In several cases we have taken limbs with roots from trees which have soon outgrown in size the tree they were originally cut from, as shown to you while inspecting a portion of the plantation.

I would strongly recommend the would-be settler to pay some attention to this hardy tree, which seems to be able to survive the severest drought that I have known for the last twenty-four years. It grows well in the different soils from high-water mark, the edges of salt and clay pans, open forest, and scrub country, and may be found growing on almost bare rock, and gives a reasonable return after six years—about 3 lb. of rubber per tree. For experimental purposes, from a full-grown tree with a diameter of $2\frac{1}{2}$ feet, I got the natives to bleed it for all it was worth, and obtained 7 lb. weight of marketable rubber from the tree, which is still on the plantation.

The rubber from the *Ficus Rigo*—which I first brought under notice and placed on the market in London some twelve years ago—was reported on by Silver and Co. as being on a base of Pará rubber, and the same class of rubber has been sold in Sydney this year at 4s. 4d. per lb.

SISAL HEMP.

This has been experimented with and given excellent results. Whatever is in the soil or climate that is so beneficial to the hemp, I am unable to say. The idea that sisal hemp will not do well in Papua is a mistaken one. No doubt there are places where the soil is too rich or the rainfall too great to ensure its success. The poling of the plants takes place much sooner here than in other places. The first experiment I made from six plants about three years old; 380 leaves were cut, an average of 64 leaves to each plant. The average weight of each leaf was $2\frac{1}{4}$ lb., or 872 lb. for the 380 leaves. From forty of these leaves 3 lb. of dressed fibre can be obtained. An acre planted with hemp at 8 feet apart gives 680 plants to the acre. At three years old these will give an average of 64 leaves per plant, or 43,520 leaves in all, which will give 3,664 lb. of marketable fibre.

A second experiment, from two plants just three years old, and which suffered a good deal from the drought: At the age of eighteen months I cut off all the suitable leaves and obtained 3 lb. 13 oz. of fibre from them; on the third year I again cut off all leaves, and obtained 4 lb. 4 oz. from the two plants. These plants were a fair average from $1\frac{1}{2}$ acre.

Sisal hemp appears to grow well all along the coast line in this division and for about 10 miles inland. It is being tried about 21 miles inland, but found to grow slowly. I am forwarding the made fibre on to you, the results of the two plants, which are still growing here.

GENERAL.

With regard to the possibilities and development of this division in an agricultural and pastoral point of view, I consider it has a great future. There are very large areas of the finest agricultural land to be found here, that are most suitable for propagation of tropical economic industries—in many places from the sea level. The hill country is too steep for European planters. There is no reason why this should not be left to the natives, they preferring the steep hillsides for gardening purposes.

I have no doubt the many economic plants, &c., that grow throughout the Malay States and Java will do equally as well in the territory of Papua, and I consider that Papua has many advantages, as most any climate may be found in the Alpine regions.

The river banks, valleys, and plains are very fertile and productive. It is a thousand pities to see the wholesale destruction of these valuable scrubs and lands by the natives through their primitive and rotten way of agriculture. They now run all over the country selecting the best and easiest spots for forming what is known here as a garden, regardless of blocking up roads, waterways, and channels, besides encroaching on lands they have no more right to than I have. One of the worst evils arising from this is the rapid spread of noxious weeds of the worst kinds, which must be put a stop to, and natives as well as Europeans compelled by law to keep such out of their plantations.

FORESTRY.

With regard to timbers, we have some of the finest to be found in the way of hardwoods and fancy-grain woods, suitable for cabinet and turning purposes—pines, cedars, oaks, casuarina, and many other fine timbers, of which little or nothing is known, are to be had here. I personally am well acquainted with the native names of many. Some of the hardwood piles placed in the ground as Dubu posts have been there for over 100 years, and are still sound. Some few years ago I took a block of this wood to England, where it was reported on by experts, and valued at 2s. per foot cube. Two other woods—Marava and Diaroa—I have known to be in the sea for the last twenty-four years and not affected by the marine worm.

I am of a strong opinion that it would well pay the Commonwealth Government to institute in Papua an agricultural department—a native labour bureau—also to appoint a forest ranger and a native protector.

PASTORAL.

There is a great extent of good cattle country in the Rigo district—rolling downs and plains, with good grass, and, in ordinary seasons, is well watered by numerous creeks, with light belts of good scrub land on the banks, and with an overshoot dam here and there. No difficulty would be experienced in obtaining water; besides, there are the two large rivers running through the land. The area of this land is about 60 miles by 25 miles. Another fine valley worthy of mention is that known as the Keyfri Valley Goldfield, at the end of this division. It is at an altitude of 2,000 feet, with a most desirable climate, and only three days' walk from the coast. The area is about 15 miles by 10 miles, and is well watered by the head of the Musa River. A good road is possible to the valley, with a good shipping port and landing. In both of these prospective pasture belts there is a good supply of timber for fencing purposes, of the Eucalyptus family.

Through the first-mentioned block, there are good bridle tracks, and the natives are well under control. It carries a big population, and a settler would be as safe amongst them as he would be in many of the big European cities.

Many years ago a good bridle track was cut for 91 miles to the top of Mount Obru, in the Main Range, which I consider one of the most practical to the interior, and it is quite possible to make a dray road from the coast at Kapa Kapa to the fertile valley of the Kemp Welch River. Rigo is the key to the many inland tribes so well known to the Government, and there is far more native traffic on the road here than any other road of its length in the possession. You asked me when here what was to become of the improvements made at this place when the Rigo Station is removed. I can only answer in the negative, "It must be sadly neglected." It is one of the deepest regrets to me and others that I understand the station is to be removed, and, if allowed to take place, is, in my opinion, one of the worst political blunders that could possibly happen.

NEW FIBRE PLANT—THE ZAPUPE.

A full description of the zapupe fibre plant, for which we were indebted to the courtesy of Mr. W. B. Murray, editor of the "Mexican Investor," appeared in our December number, 1906, and we refer our readers to that journal for all particulars concerning what now appears to be the most valuable fibre plant yet discovered. From the October issue (1907) of the "Investor" we take the following:—

Zapupe culture continues to be a field of large investment for many capitalists of this city, and also for many investors from different parts of the United States. Within the past month there have been no less than six large concerns, two of which are located in New York and one in Kansas City, that have sent their representatives here to look carefully into the question of zapupe culture.

The statement of these representatives, after their investigations were completed and when they were on the eve of departure to make their reports, has invariably been that they saw a great future ahead for the industry of raising zapupe and handling the fibre.

Deals in land suitable for raising the fibre plant have been made to the number of three, and it is shown that several others are pending. With these there is a strong suspicion that other deals have been put through on the quiet by parties who wanted to get everything ready before anything leaked out about their movements.

Samples of the wonderful fibre plant which have been submitted for examination and analysis to experts in New York have served to bring back the most glowing reports. The experts say the zapupe fibre is far superior to henequen fibre, can be used in the manufacture of a much finer grade of material, and as such will command a good deal higher price.

The nature of the plant has many things to recommend it to the planter. It is very hardy, runs little danger from the depredations of stock, matures quickly, and lasts for five years; is not dependent to any extent on climatic conditions or moisture, and the fibre is extracted from the leaves with economy and speed.

There are several grades of zapupe, and planters have not as yet come to an agreement as to which is the best. The industry is in its infancy as yet, and many things are still open for argument.

If henequen made so many millionaires in Yucatan and Campeche, it seems certain that more will be made by zapupe in Tamaulipas and Veracruz. Planting at present is more in the northern part of Veracruz, though there are large tracts set out in Southern Tamaulipas as well.

A New York company has been formed to go into zapupe planting on a large scale, and the "Investor" on this point says:—

C. H. Barkley, who was here (Tampico) some time last summer in connection with an accountant's investigation, and at that time became well known here, has become interested in the zapupe business of this section, and, with the able assistance of M. Poindexter, of this city, will form a company in New York to carry on an extensive planting business. Mr. Barkley is a resident of New York, and is said to have a large acquaintance among Wall-street capitalists.

Much planting has already been done in this section, probably 500,000 plants having already been set out. Another year, it is believed, will see this number more than quadrupled. Within five years Tampico should be a great fibre exporting port. Measures are now being taken to get in stock hundreds of thousands of the young zapupe scions for planting. The available number of these is now somewhat limited, but this is only a temporary difficulty.

GROWTH AND EXAMINATION OF SEEDLING CANE.

For many years past seedling canes have been raised in quantities as large as the trial grounds at St. Clair would allow, and several good varieties have been secured. Looking back, however, at the methods hitherto adopted in growing and testing these canes, a conclusion has been arrived at which it is anticipated will considerably lessen the expense of future experiments. The practice at first adopted was to grow seedlings, and to test the most likely canes for sugar content at the end of the first year's growth. Those passing the test were again planted, again tested, and a certain number retained for a third year's growth, when they were again chemically examined, and so on for five or six succeeding years. In the end, if three or four good new canes were secured, the work was considered satisfactory. On summing up the expenditure of time and money, however, it was found to be a very serious item in the annual upkeep of the experiment, and, realising this, the following system has now been adopted for the St. Clair experiments:—

It has been assumed that the first quality in a cane is its ability to give a heavy yield; second, to ratoon well; third, to stand adverse seasons, wet or dry; fourth, to grow well on various soils, and have plenty of vitality—*i.e.*, grows quickly from cuttings or tops; and fifth, to be immune to the attack of disease.

No matter how high the sugar content may be, no matter what its milling capacity may be, if it cannot pass the cultivator's test for weight per acre it must evidently be finally discarded. Therefore, unless a cane is first tested for yield per acre, it is clearly logical to conclude that it is useless to test it for other qualities, as it wants a primary essential quality demanded by the cultivator. On this ground our experiment has for the past two years been carried on, "in inverse order" to the course adopted when the experiment was first started. To completely invert the process would naturally be wrong, as it might be found at the end of the course that the only canes left were those which must of necessity be condemned for their want of saccharine contents, and therefore it would be advisable to commence examination for saccharine contents at, say, the fourth or fifth year. Some may say that there is no difference between the two methods. It is, however, clearly to be seen that by the inverted method the cultivator's test is taken first, and therefore a far less

amount of chemical work has to be performed, especially in the first stages. It is, of course, known that under the first system many canes were condemned the first year, owing to their not showing field characters; but it is also a fact that ninety-nine hundredths of those which were chemically examined fell out in after years, and probably after several examinations, and the work on them was therefore lost. Under the new system this continuous chemical examination would be entirely avoided until the fourth or fifth year of trial, when it would be used to detect and root out all canes of low sugar content, when, instead of hundreds, the canes to be examined would probably be counted by dozens, and exactly the same end will have been attained.

It is, of course, quite evident that it will be useless to report on canes until they arrive at the five years' stage, as it would amount merely to the enumeration of the canes cut out and the number left on the field—in fact, a record of the survival of the fittest.

The canes left standing after the first field examination would be tested the second season for vitality from cuttings; the third season as 1st ratoons; the fourth as 2nd ratoons, and immunity from disease, as it has been noticed that ratoons will always show a tendency to disease quicker than canes with greater vitality; and again as "plants" the fifth season, when chemical examination could begin with advantage, as it would be commenced on a set of canes which have already stood a series of tests, and from which set little or no further cutting out would be necessary, except on the ground of chemical selection, to finally decide which are to be retained and which rejected for field cultivation.

Chemical tests "cannot tell us whether canes have vitality, whether they are immune from disease, whether they will ratoon well, or whether they will stand drought or wet seasons," and these qualities, therefore, may more conveniently be tested first without waiting for analytical results; but the latter are, of course, essential in order to assure the planter that the cane he is growing has a certain sugar value—in fact, prove to the growers that good canes have been found—and to give a definite value to each.—"Trinidad Botanical Bulletin."

LANDOLPHIA RUBBER VINES.

Mr. Jas. Pink, "The Badgeus," Wellington Point, writes:—I note that in this month's (November) Journal you are calling attention to rubber vines (*Landolphia*), in which I once took great interest.

When I was in charge of the Botanic Gardens, I obtained a collection of these plants from the Royal Gardens, Kew, which I planted out for purposes of propagation. I felt sure that these plants, when they became better known, would be valuable for Northern Queensland. Allow me to congratulate you on being the first to call attention to the value of these plants.

VIEWS AT THE STATE NURSERY, KAMERUNGA, NORTH QUEENSLAND.

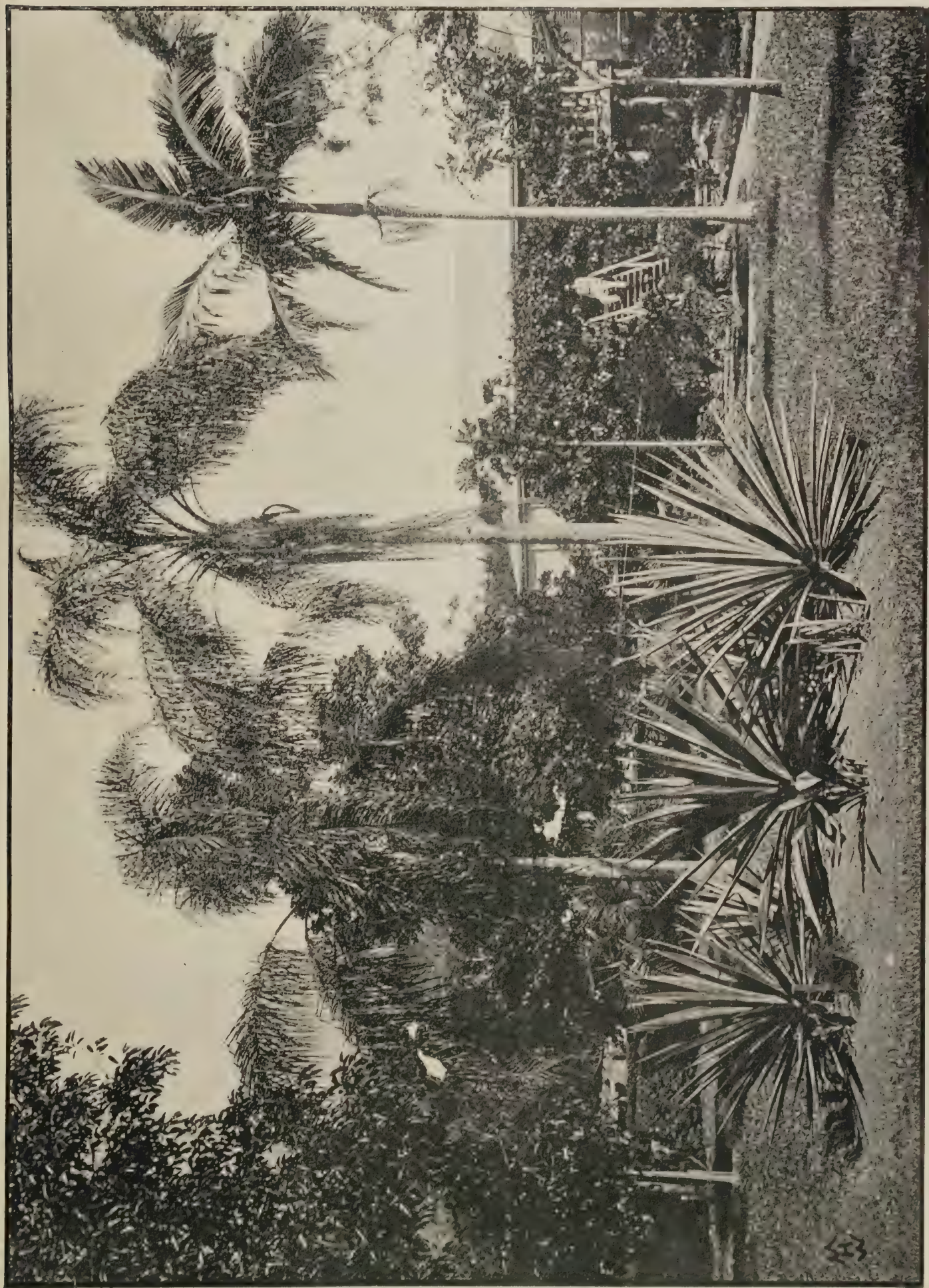
Some time ago we received from the manager of the Kamerunga State Nursery, who is also the Instructor in Tropical Agriculture, a series of views taken at the Nursery. We regret that, owing to the illness of Mr. Newport, we are unable to give particulars concerning their growth, production, treatment, &c., but we hope to do so when Mr. Newport returns from Ceylon, whither he has gone for some months to recuperate after his severe illness.

The Red Cedar is an indigenous tree which is common to the entire coast of Queensland. Forty years ago large quantities of this timber used to be cut in the scrubs which then occupied large areas of the Logan and Albert



WEST AFRICAN OIL PALMS AT KAMERUNGA STATE NURSERY, N.Q.

Plate II.



PALMS AND AGAVES AT KAMERUNGA STATE NURSERY, N.Q.

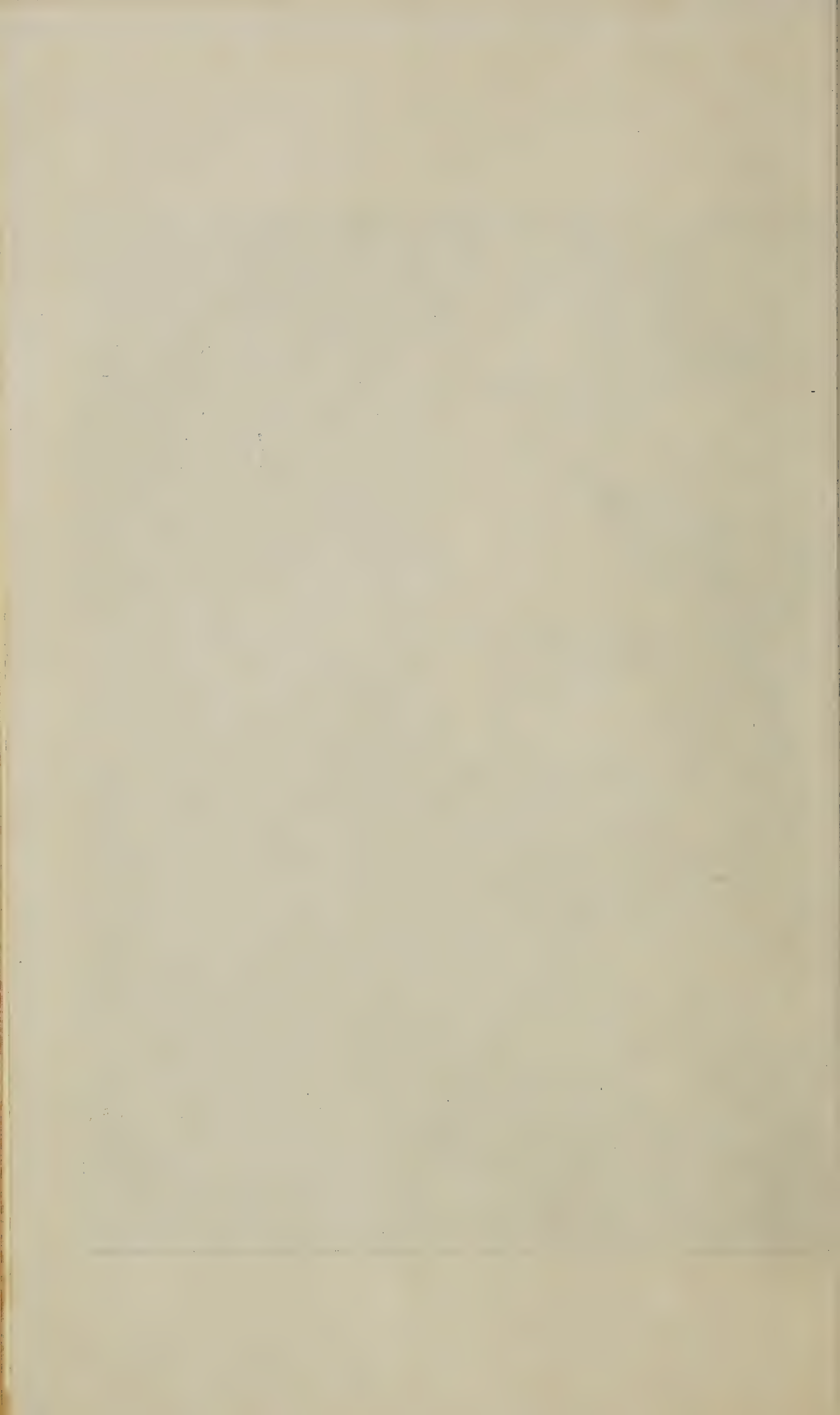
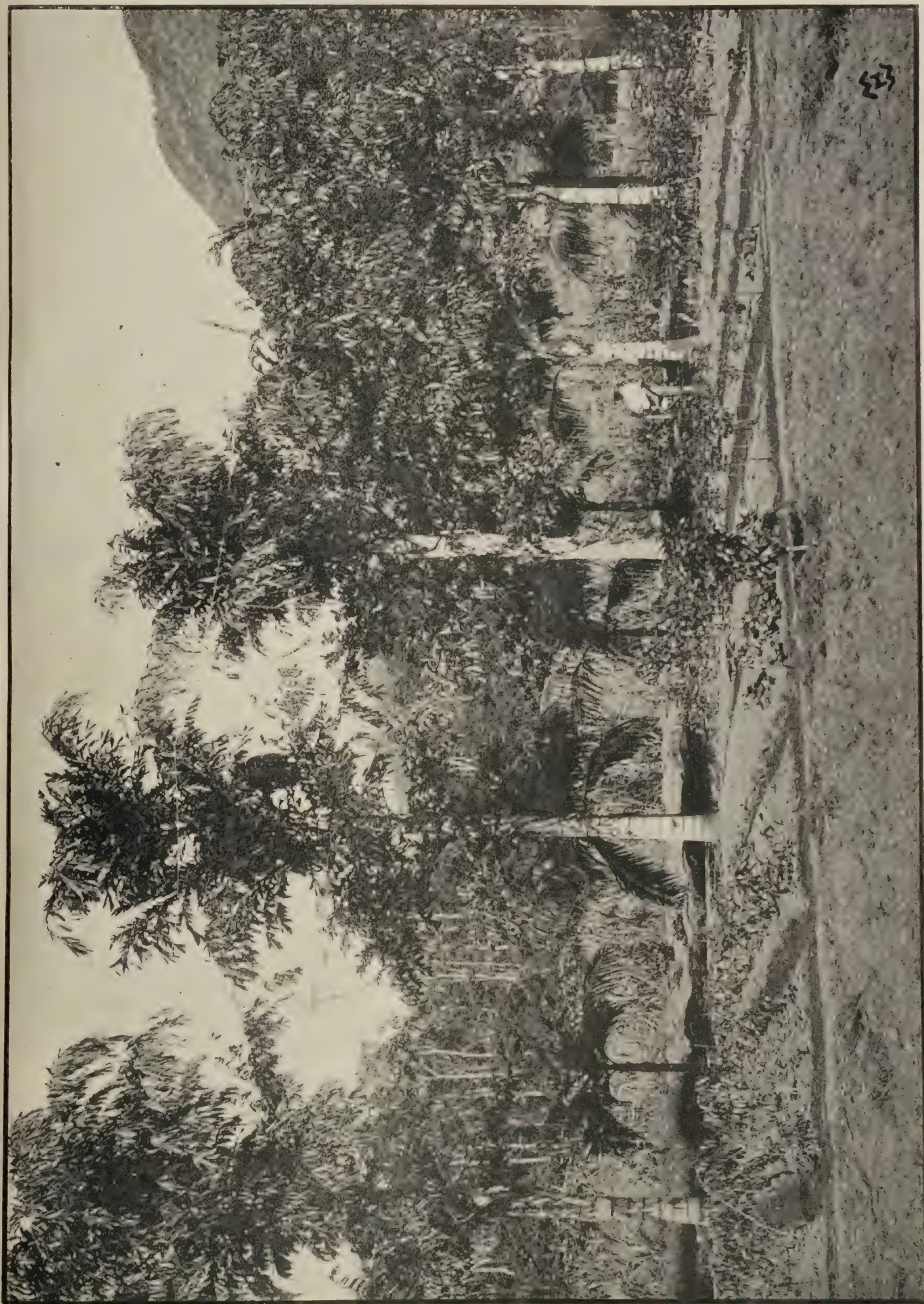


Plate III.



BASTARD SAGO PALMS AT KAMERUNGA STATE NURSERY, N.Q. RED ARECA PALMS IN THE BACKGROUND.

Plate IV.



RED CEDAR GROWING IN THE OPEN AT KAMERUNGA STATE NURSERY, N.Q.

districts. To-day the trade in cedar is practically confined to the scrubs of the far North.

The palms shown in another illustration are *Cocos plumosa* and *Archonophoenix Alexandreae*, both to be seen in Southern gardens. The agaves in the foreground are representatives of the *Agave rigida*, var. *sisalana*, which produce the valuable sisal hemp of commerce. The third illustration gives a very good idea of the West African oil palm, so well described in the December number of this Journal, 1897, by the late Mr. E. Cowley, who was then manager of the Kamerunga Nursery. It is a native of Guinea, and the best palm wine is made from it. A well-developed cluster of fruit spike may attain a weight of 40 lb., bearing upwards of 800 nuts the size of a walnut. The outer portion of the fruit, almost of lard-like consistency, yields, through boiling, the commercial oil for soap and candle manufacture. The plants here depicted were imported by the Department of Agriculture from Sierra Leone in 1890. Out of 20 plants 8 only survived the voyage. In 1896 two fruited. In 1897 thirty fruits appeared. Each nut weighed about half an ounce, and an entire spadix weighed 5 lb., which gives about 160 nuts to the bunch. The kernels are also used for oil production, and are worth about £17 per ton.

The sago palm, as its name implies, is that from which the sago of commerce is obtained. It is indigenous in Papua, where it constitutes an article of trade between different portions of the possession.

The areca palm-tree bears nuts also used for oil-making purposes.

ANT EXTERMINATION.

For the extirpation of ants the following remedies are good. To be effective they require attention and perseverance. It is well to find their main burrow or nest, if possible. Arsenic is sure destruction to them, but it is dangerous to handle.

Air-slaked lime plentifully dusted in warm dry weather over and around the hills, or in the house or other places infested, will cause the ants to vacate them in a short time.

Snuff: Dust a little snuff upon the floor of the rooms or pantry.

Draw a thick chalk line around a smooth tree or across an upright board or post and they will not pass over it.

Camphor: Put a piece of camphor, the size of a filbert nut, into 2 quarts of hot water. When cold apply to pot and other plants, and the insects will be driven off without injury to the plants.

Mix together 1 part of calomel and 10 parts of finely powdered white sugar, and lay it in little heaps about their nests and runs. The ants will eat it and die.

Coal oil, mixed with six times its bulk of water, sprinkled over the nests every few days, will kill and drive them away.

Pans or saucers, nearly filled with honey or sweet oil, attract ants, and they are drowned in it.

Flowers of sulphur, $\frac{1}{2}$ -lb.; potash, 4 oz. Set in an earthen vessel over the fire until dissolved and united. Afterwards beat to a powder. Infuse a little of the powder in water and sprinkle in places infested with ants.

To Destroy Black Ants: A few leaves of green wormwood scattered among the haunts of black ants will drive them away.

Red Ants: Powdered borax sprinkled around will exterminate both red and black ants.

Make holes in the ant hills, 6 inches deep and 1 foot apart, with an iron or zinc tube fitted with a wooden stake. Withdraw the stake. Pour 1 tablespoonful of bisulphide of carbon down the tube. Withdraw the tube and stop the hole immediately. Bisulphide of carbon is very inflammable.

Entomology.

THE PUMPKIN BEETLE.

Farmers and market gardeners have for the last three months suffered considerable losses by the depredations of a beetle popularly known as the pumpkin beetle, which has been devastating the leaves and flowers of pumpkins, marrows, and cucumbers. In response to a request for some information on the habits of the insect, and on how to destroy or repel it, Mr. H. Tryon, Entomologist and Vegetable Pathologist to the Department of Agriculture and Stock, supplies the following notes:—

THE GALERNCA OF THE PUMPKIN, &c. (*Aulacophora Olivieri*, Baly).

The beetles submitted as being concerned in serious depredations in your vegetable garden is one brought under public notice by me in October, 1889, the name Banded Galernea being then assigned to it, in allusion to the fact that it belonged to the group of plant-eating beetles, named *Galerncidæ*. At the same time a plain-coloured species, of similar habits, was described, named the Brown Galernea [*vide* Tryon (H.): "Insect and Fungus Pests," 8to, Ed., 1889, p. 173]. Since then I have written concerning it and its depredations on several occasions. The following is the text of an article headed "Banded Galernea—Pumpkin Beetle," that was thus contributed to the "Daily Mail" of 30th October, 1903:—

The insect concerned in these depredations is one that not only attacks the cucumber plant, but is also partial to the foliage and tender organs—flowers especially—of the different varieties of pumpkins and melons. This is an orange-coloured beetle of an oblong form, measuring about $\frac{1}{4}$ -in. in length, and rendered conspicuous by the presence of two broad black bands crossing the wing covers, the posterior of which bands is interrupted in the middle. Although popularly styled a ladybird, it is not a member of that (the *Coccinellidæ*) family of beetles. It may, therefore, be most appropriately designated the Banded Galernea, to distinguish it from the Plain-coloured Galernea, a beetle of analogous habits and having the same host plants. The entomologist terms it *Aulacophora Olivieri*, Baly. Unlike many of our plant destroyers, it is an indigenous insect, and, therefore, not derived from some foreign source.

With regard to the phases of the life history of the insect, it may be mentioned that those represented by the egg, the larva, or grub, and the pupa or dormant state, are passed beneath the surface in the soil, but not necessarily in that forming the location in which the plant injured is being grown. [*Note.*—In the case of the true leaf-eating ladybirds, *Epilachna* spp., on the other hand, all these stages of their existence are passed above ground in the plant victimised.]

When, however, injury to a plant or plot of plants of the kinds favoured is of long continuance, there are grounds for concluding that the beetles implicated latterly are of quite local origin, being apparently the progeny of the beetles that had occasioned the damage when this was first experienced.

The Galernea, passing, as we have seen, much of its life in obscurity, can alone be directly assailed when it has arrived at the perfect or beetle condition. The measures that are then available for coping with it may be distributed in two classes—(1) Repellents and (2) destroyers.

1. *Repellents*.—The Banded Galernea, although endowed with a voracious appetite, usually declines to consume foliage that has become soiled. Accordingly, the plants may be more or less protected by dusting upon them, the foliage especially, fine wood ashes and air-slaked lime, or plaster of Paris, and especially if these substances have had a few drops of carbolic acid or kerosene previously added to them, with simultaneous stirring, to enable the odour of these bodies to generally pervade them. A powder formerly on the Brisbane

market, named "Iguano—Insecticide Manure," has proved to be in a certain degree serviceable in this connection when exhibited in the way proposed. [*Note.*—This substance is now known as "Vaporite Strawson," and put up by Messrs. Strawsons, of England.]

2. *Poisons.*—But the plant may likewise be protected by poisoning the insects that light upon them by the application of some reagent containing arsenic—*e.g.*, arsenite of lime, arsenate of lead, London purple or Paris green. Of these, Paris green (Blundell and Spence's) is the one most readily obtainable and most simple to administer, but, of course, it must be used subject to the observance of the safeguards prescribed by the party furnishing it. This insecticide may be applied to the plants in two different ways—(1) In the dry state as diluted powder and (2) as forming an ingredient in a liquid. In the former case it may be incorporated with such substances as flour (inferior quality), plaster of Paris, or air-slaked lime. In thus diluting the Paris green, and to secure that equal bulks of the different mixtures will contain approximately the same quantity, it will be necessary to use twice the amount by weight of plaster of Paris as of flour, and the lime in intermediate proportionate quantity—*e.g.*, 1 lb. of Paris green to 100 lb. of plaster of Paris, or 50 lb. of flour. It must not, too, be overlooked that the obtainment of a perfectly uniform mixture is not easy of accomplishment, and requires perseverance (and it can only be suitably prepared when made immediately prior to use).

The Paris green may be otherwise administered in suspension in water, by adding it (after first forming a paste with the powder, as in making paint) at the rate of $\frac{1}{2}$ -oz. to every 4 gallons of water (one kerosene tin full). Lime in about equal weight to that of the insecticide named should also be comprised in the wash, as well as a few spoonfuls of molasses. Used in a dry form the mixture containing the poison should be tied in a piece of fabric of open texture to a stick and thus dusted upon the plants, the operator always working in the early morning, before the dew has risen, and with the wind to his back.

In the liquid form it must be applied with the aid of a spray-pump, the wash being kept well stirred whilst in use in order to keep the Paris green in suspension in it.

With regard to these two methods of procedure in using the insect poison, it may be remarked that the latter is more economical as well as the more efficacious of them.

Mr. Voller, formerly in the service of the Agricultural Department, testifies that he has found the following mixture useful in protecting cucurbitaceous and other plants from the attacks of leaf-eating insects:—Boil together 1 lb. of soda and 1 lb. of resin in 1 gallon of water, and when incorporation has been brought about add this to 5 gallons of warm water, a few parings of soap being first dissolved therein to facilitate passage through the spray-pump.

Whether repellent or insecticide be resorted to it is, of course, to be borne in mind that only the parts of the plant on which the substances used repose are protected. Accordingly, therefore, renewed applications are necessary as growth proceeds. Again, early attention to the presence of the pest is called for. In the case of this injurious insect there should be no such thing as a negligible quantity. Oftentimes, if young plants, whether of cucumber, pumpkin, or melon, are freed from time to time from the few insects of the kind under notice that attack them by hand-picking alone, a simple and practicable procedure, their subsequent soundness is secured, as it is commonly these that, left to themselves, form a starting point for a second generation of insects of greatly augmented numerical strength, and thus give rise to the serious damage to the crops and subsequent loss to its proprietor so commonly made a matter of complaint.

A rotation of crops providing for the temporary absences of those yielded by plants of the cucurbitaceous order (cucumber, melon, pumpkin, &c.), to which the present insect is so partial, will serve, moreover, in some instances in banishing the *Galeruca* from a farm at least for a while.

Animal Pathology.

TICK FEVER IN CATTLE.

TECHNIQUE OF THE METHOD OF PREVENTIVE INOCULATION.

(REVISED EDITION)—1907.

By C. J. POUND, F.R.M.S., Government Bacteriologist.

The method of immunising cattle against tick fever (*Piroplasmosis*) by injecting into the susceptible animal a definite quantity of defibrinated blood from a recovered animal has proved most successful in those countries where the disease has become endemic. The initiation of this method was associated with an exhaustive series of crucially conducted experiments, which took place at Indooroopilly, Mundoolan, and Inkerman in the early part of the year 1897. Since then this scheme has received the staunchest support from such eminent authorities as Professor Koch, Drs. Eddington, Theiler, and Hutcheon, in South Africa; and Drs. Francis, Connoway, Salmon, Melvin, Schroeder, and Mohler, in the United States of America. Further, as a result of the numerous researches of these scientists, the stock-breeders in the tick fever States of North America, the Argentine, Cape Colony, the Transvaal, and Rhodesia are all more or less having their cattle protected—particularly those that are bred in clean districts and sent into fevered country.

There can be no doubt, whatever, as to the practicability of this method. For several years now the annual and special reports that are issued from the Agricultural Department of those countries where tick fever obtains, emphasize the highly satisfactory results obtained by inoculation, and strongly recommend its general adoption. Stockowners in North Queensland know only too well that the losses among unprotected stud cattle coming from clean country in the Southern States amount to nearly 100 per cent.; whereas amongst those animals that have recovered from inoculation fever the mortality is more often less than 2 per cent.

NECESSARY APPLIANCES.

By carefully considering the following directions, anyone accustomed to work among cattle may be able to perform the necessary operations without personal instructions. The operator must be provided with the following necessary appliances:—

1. Six feet of whipcord.
2. Trocar and canula. The latter should not be less than $\frac{1}{8}$ -inch diameter.
3. Syringe to hold 10 c.c., fitted with about 3 inches of thick-walled rubber tubing, and one or two of the improved needles.
4. Two large wide-mouthed jars or jugs, to hold about $1\frac{1}{2}$ pint each.
5. Two small wide-mouthed bottles, to hold about 2 oz. each.
6. Twenty to thirty fowl-wing feathers, previously washed in cyllin solution, 1 in 400, then in clean water, and finally dried in the sun.
7. Several pieces of clean linen or calico.
8. Clinical thermometer.
9. *Note.*—For the inoculation of large herds of ordinary station or wild cattle in a crush, some additional appliances are found to be absolutely necessary. At first a by-way tap was used, but, in consequence of the possibility of so many errors occurring through the operator turning the tap the wrong way, this accessory has been superseded by a specially designed double-action valve made in two separate pieces. The larger part A, with two nozzles, is fitted on

to the front of the syringe; to the upper or long nozzle is attached some 10 or 12 feet of thick-walled (small aperture) rubber tubing; at the other end of this tubing is fixed the inoculating needle. To the smaller or lower nozzle is attached about 30 inches of the same kind of tubing, the opposite end of which is fixed on to the smaller part B, which is placed in an upright position at the bottom of a small sodawater bottle, which is kept in the trousers-pocket of the operator in charge of the syringe.

10. In previous editions of this pamphlet a 1-20 carbolic acid solution was recommended for disinfecting purposes. This has been superseded by a new product known as cyllin, which possesses a high germicidal efficiency ranging from 10 to 30 times that of carbolic acid, and which for the higher forms of animal life is at least 10 times less poisonous. Further, it has no corrosive action on the skin.

As an antiseptic for washing instruments or the skin of the animal to be operated upon, cyllin disinfectant may be employed in the diluted form of 1 in 400. For general purposes this standard solution may be made by adding one teaspoonful of the strong cyllin to 5 pints of water, and afterwards well shaking to form a milky-looking mixture.

METHOD OF PREPARING CALVES FOR THE SUPPLY OF IMMUNE BLOOD.

Although the actual method of drawing the blood and injecting the same into animals to be protected has not been improved upon, still, in addition to the various improvements in the inoculating instruments, there have also been several modifications in the method of rendering the blood of animals suitable for general inoculation purposes.

The number of calves required to supply blood naturally depends in a great measure on the size of the herd, or, in fact, the number of animals to be inoculated. Experience has shown that twelve yearling heifers will provide sufficient blood to inoculate a herd of 20,000 cattle; while it is recorded that 8,000 and even 10,000 cattle have all been efficiently inoculated with the blood from only four animals. For general inoculating purposes, the blood of an animal artificially inoculated is to be preferred to that from an animal recovered from natural Tick Fever, the mode of operation being as follows:—Procure the desired number of healthy yearling calves (heifers, if possible), and a supply of freshly drawn defibrinated blood from a naturally recovered animal. The best way of operating is to throw each calf on its left side; the legs may be either tied or held by an assistant; the head is covered with a bag, which makes the animal lie quieter than it otherwise would do. By means of the piece of whipcord which is placed round the base of the animal's neck with a running noose, the right jugular vein is compressed so that in a few minutes it becomes dilated or swollen by the blood coming from the animal's head. A very necessary precaution will be to flatten the hair on the skin covering the vein with a little solution of 1 in 20 carbolic acid; this removes any danger of introducing foreign matter which might produce blood-poisoning or an abscess under the skin. The calf is lying on the ground with its feet from the operator, who, standing behind, lays his left hand on the neck and gently holds the swollen vein in a steady position between the forefinger and thumb close up to the cord to prevent the vein from shifting laterally. He then takes the improved needle in his right hand, and steadily pierces the skin into the vein. If the vein has been pierced successfully, blood will spurt out. An assistant then hands the operator the syringe filled with 10 c.c. of the recovered tick-fever blood. The nozzle of the syringe is then immediately connected with the needle by means of a small piece of rubber tubing in such a manner that there is an uninterrupted column of blood from the vein to the end of the piston-rod

of the syringe; for the fact must not be overlooked that a small bubble of air injected into the bloodvessel may cause instant death of the animal. Directly the syringe is coupled with the needle the cord is removed from the neck, and the blood ejected from the syringe into the vein. It is advisable on withdrawing the needle to pinch the skin round the wound and apply a little more carbolic solution before releasing the animal. After each calf has been inoculated, they should be kept in a well-grassed paddock with plenty of fresh water, and their temperatures taken regularly night and morning from the eighth to the twenty-fourth day after inoculation. Those giving a very decided reaction—viz., temperature rising from the normal (101·5 degrees Fahr.) to 106 degrees Fahr. or higher—are, when they have completely recovered (which will be within six weeks), suitable subjects for drawing blood from for general inoculation purposes, and are generally spoken of as “immune calves.” The reasons why young animals are preferred are:—(1) They are easily handled and managed. (2) The subcutaneous tissue of the neck between the jugular vein and the skin is not very thick. (3) In inoculating blood from a calf there is very little risk of introducing tuberculosis, which is seldom found in calves; however, in order to minimise any possible risk from this disease, the calves can be all previously tested with tuberculin.

METHOD OF DRAWING THE BLOOD FROM THE IMMUNE CALF AND PREPARING SAME FOR GENERAL INOCULATION PURPOSES.

The immune calf is thrown on its left side, and a cord tightened round the neck as previously described, but instead of a needle the operator takes the trocar (with canula attached) in his right hand, and with it in a vertical position steadily pierces the skin into the vein. Immediately the point is through the wall of the bloodvessel, the instrument is held in a slanting position and gently pressed further into the distended vein. The operator then withdraws the trocar with the right hand, the while holding the sheath or canula with his left, and keeping it well into the bloodvessel. If the vein has been successfully pierced, blood will flow copiously. If it does not flow, the operator returns the trocar into the sheath and gently withdraws both of them a very slight distance but not out of the wound, because at the first insertion the trocar may have been forced through the vein or on one side of it, which often happens in the case of young thick-necked bulls. However, as soon as the blood flows freely on withdrawal of the trocar it is caught in a perfectly clean wide-mouthed bottle. From an animal six months old half a pint of blood may be taken, and as much as a pint and a-half from a yearling. In the summer time, when the flies are plentiful, a little tar should be placed on the wound before the calf is released. As soon as the requisite amount of blood is drawn, it should be well stirred for about five minutes with a whisk formed of half a dozen wing feathers from a duck or fowl. At the end of that time the whisk, when lifted out, will be found to be covered with stringy-like fibrinous blood-stained matter. This is the fibrin, and its removal prevents the blood thickening, clotting, or coagulating. The process of whisking and removing the fibrin is known as defibrination. Defibrinated blood is that which has been so treated. The blood is afterwards strained through a piece of clean linen or calico into another clean bottle, and is ready for use.

DETAILS OF THE PROCESS OF INOCULATION.

Allowing 5 c.c., which is equal to one teaspoonful, for one bullock, one pint of defibrinated blood would be adequate to inoculate about 100 cattle. To minimise, as far as possible, the risk of contamination, the following precaution may be adopted:—The operator puts about 2 oz. of blood from the stock bottle into a small wide-mouthed bottle, which is covered with clean linen or calico. The small bottle is for actual work of inoculation, and should be filled up as required.

Inoculation should be performed without delay. Ordinary station cattle to be inoculated should be placed in a crush, and as many as possible at a time, so that the work may be carried on quickly. Dairy cattle may be secured in a bail; while young calves may be held against the rails in a stockyard. The syringe now comes into use, and a word or two of description here may be useful. It is in principle like a squirt or garden syringe, but should have the very latest improvements. The cylinder or barrel should be made of stout glass to hold 10 c.c., with metal protecting sides, on each of which is fixed either a metal ring or a projecting piece to enable the operator to inject the blood with one hand. The plunger on the piston-rod should be made of rubber. In the latest form of syringe there is a very ingenious device for tightening or slackening the rubber washer of the piston-rod without removing the latter from the cylinder. On the glass cylinder of some kinds and on the piston-rod of others (the latter preferred), there will be noticed a row of figures, each one above a transverse line. The space between each line indicated is 1 c.c. (cubic centimetre)—that is to say, when the piston-rod has been withdrawn until the figure 4 is visible, there will be 4 cubic centimetres of space in the cylinder of the syringe. On the piston-rod of all modern syringes there is also a little set-screw, which can be screwed up and down to any part of the rod; therefore, if the syringe is first filled with blood and the set-screw turned down to the figure 5, only 5 cubic centimetres of blood can be injected. The above description only refers to syringes having the figures 1 to 10 on the piston-rod reading from the handle to the rubber plunger. With each syringe there is usually supplied one or more hollow needles, each having a metal socket which fits on to the nozzle-point of the metal protector of the glass cylinder. As the animals shrink and move suddenly from the needle when thrust into them, it is very apt to get broken owing to its being rigidly attached to the syringe, and on account of its very thin wall with large aperture, which is liable to become clogged when passing through the skin; consequently another needle has been designed. The improved needle has a smaller aperture with thick wall, thus enabling the point to be sharpened on an oilstone like a lancet. The needle is fixed in a small metal handle with depressions on either side for the thumb and finger and a circular shield in front which enables the operator to have a firmer grasp. Instead of being fixed rigidly on the syringe, it is connected by means of about 2 inches of thick-walled indiarubber tube, one end of which fits on to the nozzle of the syringe, while the other is attached to the handle of the needle, thus giving free play to the syringe when blood is being injected into an animal, and the operator has more freedom in using it. The tubing should be three-eighths of an inch in diameter, and the walls so thick that the aperture is only one-sixteenth of an inch in diameter. Thick tubing does not kink and stop the flow of blood, even when turned at right angles. The instrument, having been made ready by fitting on the tube and needle, is filled with blood from the small bottle, and the set-screw fixed at the figure 5. As explained above, the inoculation of calves for subsequent supply of blood takes place direct into the jugular vein, but this process could not be carried out in inoculating cattle generally as a preventive against Tick Fever. However, the following is the method in use at the present time, and wherever adopted has given satisfactory results:—A little fold of loose skin behind the shoulder of the animal to be inoculated is lifted from the ribs with the left hand. The needle, with the flattened edge outward, is then plunged with a sudden thrust obliquely about an inch through the skin into the loose or subcutaneous tissue; thereafter the piston is pressed very slowly down, and the blood forced into the animal. Although practical experience has proved that behind the shoulder is the most favourable site for the inoculation, it may be accomplished, when necessity arises, in any other part of the body where the skin is loose. But animals should not be inoculated in the tail, the reasons being, in the first place, that the tail is exceedingly sensitive, and the needle is more apt to get broken in it than in any other portion of the body; and, in the second place,

that it is impossible to introduce the required amount of blood. The blood having been transferred from the syringe to the beast, the operation is complete. It is not necessary to take the temperatures of the animals afterwards, as if proper blood is used the inoculation seldom fails.

SPECIAL NOTES ON THE INSTRUMENTS AND THEIR USE.

THE TROCAR AND CANULA.

When using the trocar, special care should be exercised that the canula is not shifted forward beyond the little shoulder of the point of the trocar; otherwise the greatest difficulty will be experienced when endeavouring to insert the trocar into the vein.

It will be noticed that the trocar has three cutting edges at its point; therefore, if it is thrust into the vein without using any screwing motion, it will push with it three little triangular flaps of the wall of the bloodvessel, which press against the outer sides of the canula; consequently, after having obtained the required amount of blood, the canula is withdrawn, and the three little flaps, being of an elastic nature, are immediately brought into their normal position, and act as valves, in consequence of the pressure of blood within the vein, thereby preventing the blood from escaping. In this method there is no tying or stitching of the skin, as is the case when the operation of bleeding is performed by means of the fleam, an instrument which has now become almost obsolete.

To facilitate the introduction of the trocar, the skin of the neck above the vein can be cut nearly through beforehand with a sharp knife.

THE HYPODERMIC SYRINGE.

The reason why a syringe holding 10 c.c. is recommended, when only half the quantity—viz., 5 c.c.—is a standard dose for each animal, is that frequently when filling the syringe a bubble of air gets inside. This does not matter in the least, for by making it a golden rule when inoculating to always hold the syringe in a slanting position, with the nozzle downwards, the exact quantity of blood only is injected, while the remaining blood *plus* the air-bubble are kept back in the syringe.

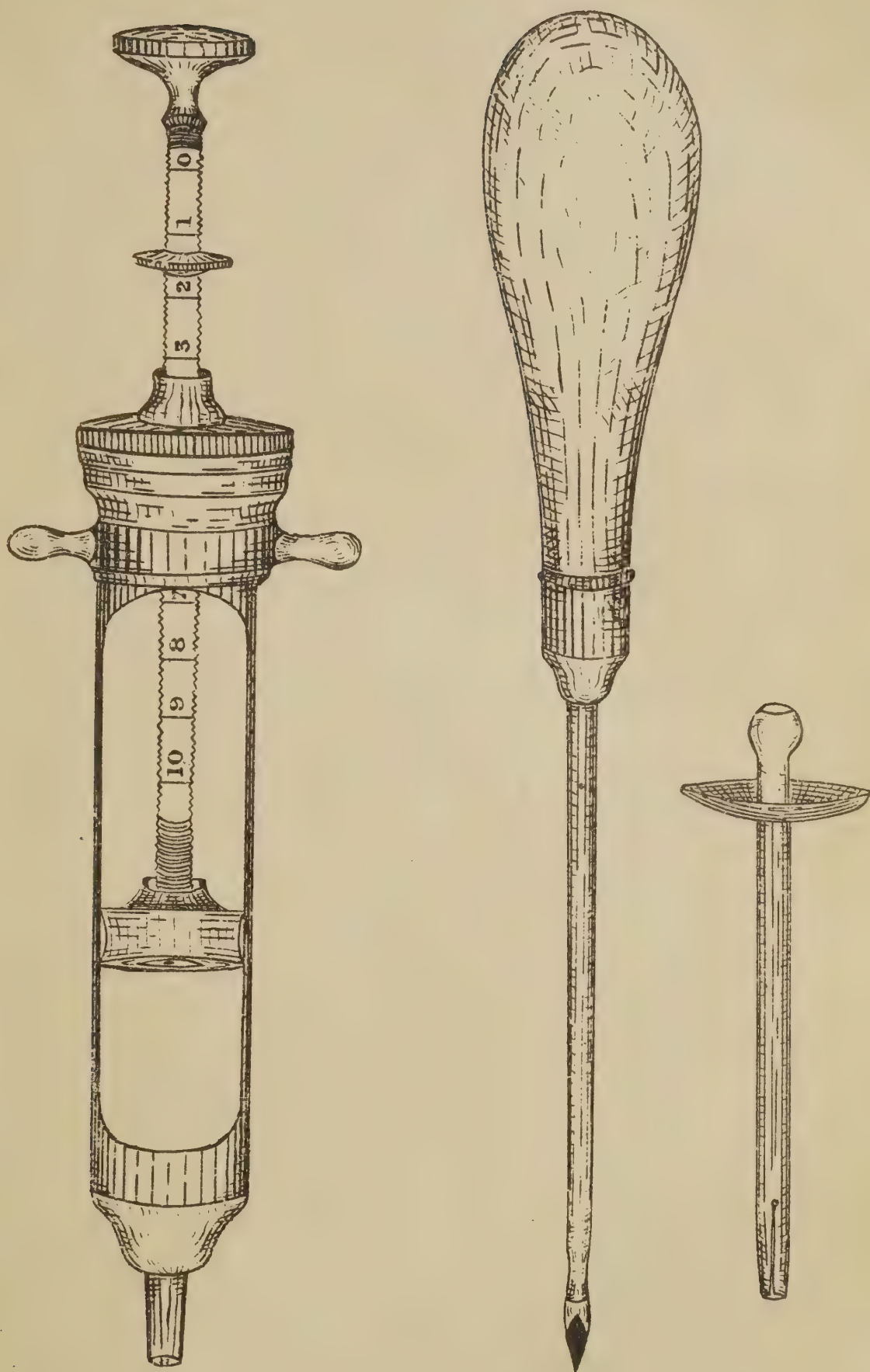
THE IMPROVED DOUBLE-ACTION VALVE APPARATUS.

This accessory is only required when hundreds of cattle are being put through in a day. The improved valves are arranged on exactly the same principle as the valves of a force-pump, so that, at every drawing motion of the plunger, the valve controlling the suction or reservoir tube is opened, and the valve of the delivery or injection tube is closed, the syringe being thus filled, while at any pressure of the plunger the suction-valve is closed, and the delivery-valve opened. The blood, once it has left the supply-bottle, cannot be returned to it through the tube, but can only be ejected through the long tube to the point of the hollow needle, so that, when the needle is placed in position under the skin of an animal, that animal must infallibly receive an injection of blood when the plunger of the piston-rod is pressed home.

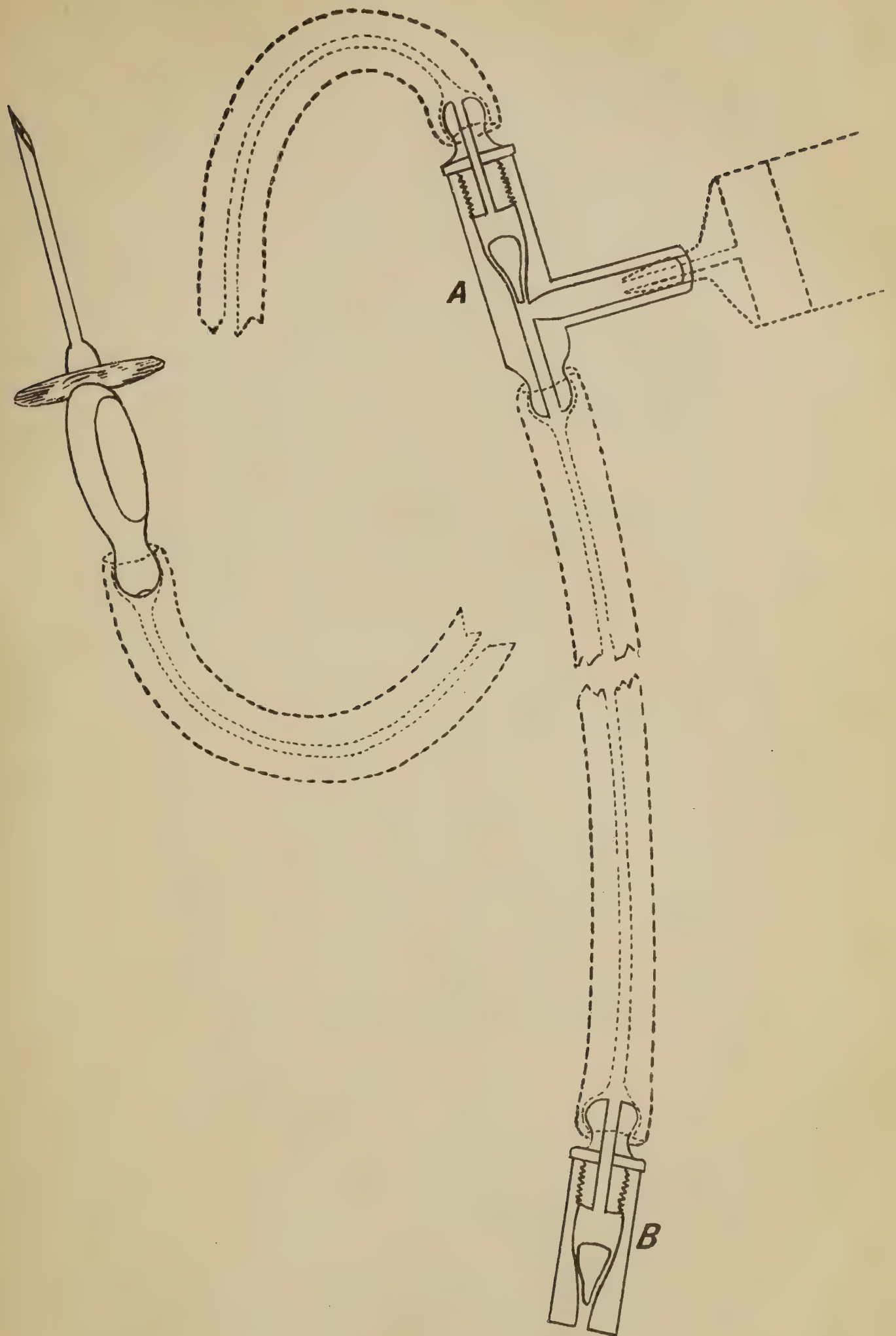
The short piece of rubber tubing connecting the suction-valve is held in proper position by a cork with a V-shaped piece cut out of its side lengthwise, and fitted into the neck of the bottle.

The syringe fitted with the improved valve and long tubing has many advantages:—

1. There is no possible danger to the syringe or the bottle of blood, as the operator in charge of same is enabled by means of the long piece of tubing to stand quite clear of the crush and the cattle to be inoculated.



Inoculating Syringe, Trocar and Canula.



*Sketch showing improved Inoculating Needle,
and position of valves when in use.*

2. The man in charge of the needle has nothing more to do than see that it is properly inserted under the skin of the animal, give the signal, and, after the blood is injected, withdraw the needle, and fix it in another animal.
3. On account of the tubing having a very thick wall and small aperture, it matters not how it is turned and twisted, as the progress of the blood will not be impeded.
4. During the operation the bottle of blood can always be protected from the direct sun's rays and from the dust of the stockyard.
5. The work of inoculating can be carried on more expeditiously, and at the same time much more effectually, than by any other means.

THE CLINICAL (CATTLE) THERMOMETER.

Prior to the first experiments in preventive inoculation for Tick Fever, the clinical thermometer and its use were practically unknown to every stockowner in Queensland. However, it is interesting now to know that this want of knowledge is, in consequence of the information which is freely disseminated by the Bacteriological Institute, fast disappearing.

To the stock-breeder and dairy farmer, the clinical thermometer is most invaluable; for by its use the registration of the body heat affords a ready means of marking the rise and fall of all fevers; likewise the thermometer can be advantageously employed to ascertain whether or not an animal reacts to the injection of blood taken from an animal recovered from natural Tick Fever, as in the case of calves to be rendered immune for the supply of blood for general inoculation purposes.

The clinical thermometer, as approved of and made for the Queensland Bacteriological Institute, consists of a cylindrical tube, hermetically sealed at both ends, about 6 inches long. At one end there is a bulb, the glass of which is very thin and filled with mercury. Running throughout the stem there is a very fine capillary bore, so as to allow the mercury to rise and fall. Immediately above the bulb the fine tube is so constructed that at this particular point the column of mercury from the bulb becomes detached from the column in the stem, causing the latter (a so-to-speak rod of mercury) to act as a register or index. Were it not for this little rod, it would be impossible to gauge accurately the temperature of the animal under observation. Hence the reason why such a thermometer is called "self-registering." Engraved on the glass stem are a number of strokes of three different lengths—viz., long, medium, and short. Opposite the first-named, we have the figures 90, 95, 100, 105, and 110, which indicate the number of degrees upon the scale of Fahrenheit. Between each of these numbers we find four "medium" length strokes, meaning degrees, although not marked in figures. Supposing that the end of the column of mercury stands immediately opposite the medium-length stroke after the figure 100, then it would imply a temperature of 101 degrees Fahr. Lastly, there are the short strokes between those of medium length. Each short stroke has the value of one-fifth of a degree, but it has become general to read clinical thermometers to the fraction of tenths of a degree; therefore the space between the short strokes is more properly spoken of as two-tenths of a degree. By way of illustration, let us assume that the index column of mercury rises in the small tube of the stem to the first short stroke after 105. This would imply a temperature of 105.2 degrees Fahr. (*i.e.* $105\frac{2}{10}$); if to the second short stroke, 105.4 degrees Fahr. Again, supposing the mercury rises up to half-way between the second and third short strokes, just above the long stroke 105, then we should say that the temperature was 105 *plus* $\frac{5}{10}$ Fahr.—expressed in figures thus: 105.5 degrees Fahr.

The majority of thermometers are so constructed that the index column, which is exceedingly fine, is magnified when it is observed at a given angle, in order to facilitate the reading.

The way to use the clinical thermometer is by taking it in the right hand, grasping the stem firmly with the fingers, and giving the arm a swinging or centrifugal jerk from the elbow, so as bring the mercury column or index down below 95 or thereabouts. Now raise the tail of the animal with the left hand and quietly insert the bulb, and nearly the whole of the stem also, into the rectum, keeping hold of the extreme end of the stem with the right-hand fingers. Allow it to remain for not less than 4 minutes, and on withdrawing it note where the index stands. This gives the temperature of the body. While taking the temperature the animal should be in a standing position. At the top end of the thermometer the glass is enlarged to form a little knob, below which a piece of string about 12 inches in length is tied, with a loop on the end to be placed over the finger of the operator, in order to prevent the thermometer from falling to the ground when taking an animal's temperature.

When the animal (cow or ox) is in perfect health, its temperature should be 101.4 degrees Fahr. (calves are usually a trifle higher than adults). Anything above 103 degrees Fahr. indicates sickness. As a rule, just before death the temperature of the body falls considerably below the normal.

A temperature of 103	degrees implies slight fever.
„ „ 104	„ „ moderate fever.
„ „ 105.6	„ „ high fever.
„ „ 106 to 108	„ „ very high fever.

The last temperature could not be long endured.

Common abnormal or fever temperatures are 104 degrees, 105 degrees, and 106 degrees, with their intervening fractions of degrees, though less frequently above the last-mentioned number.

It should be specially noted that a temporary high temperature is commonly found after exercise, and is very often caused by excitement.

Rules to be observed in using the thermometer:—

1. Never place a clinical thermometer in hot water, for, considering that it only registers just about 110 degrees Fahr., it is certain to burst where the glass is thinnest at the bulb.
2. Never allow the animal to drink freely just before taking the temperature, as the body heat is lowered when an animal drinks cold water.
3. Care should be exercised that the thermometer is read in the horizontal position.
4. Always record temperatures in a book kept for the purpose for future reference, and never trust to memory.
5. After each reading, the mercury index should be knocked down to below the normal.
6. Before putting the thermometer away in its case, cleanse it thoroughly with a solution of 1 in 20 carbolic acid.

TREATMENT DURING THE INOCULATION FEVER.

The production of immunity in susceptible cattle by the introduction into their systems of the micro-parasite often results in a more or less serious attack of tick fever. There is also a great diminution in the number of red blood corpuscles.

During the fever the animal should be given a nutritious laxative diet, with plenty of clean and cool drinking water, allowed to rest in a quiet and shady place, and disturbed as little as possible. Experience has shown that the best results are obtained when the following recommendations are carried out:—

If the animal is constipated, an occasional drench containing 3 drachms ammon. carb., 8 oz. Epsom salts, 3 lb. treacle, and 4 pints cold water should be administered. Then, as a tonic, the following should be given every four hours:—3 drachms ammon. carb., 50 grains quinine sulph., 30 drops tincture of aconite, and 1 pint water.

Tincture of digitalis, $\frac{1}{2}$ -oz., may be continued with the quinine, according to the nature of certain individual cases.

The following will be found beneficial in the convalescent stage, when the fever has run its course:—2 oz. reduced iron, 4 oz. powdered gentian, 2 oz. powdered nux vomica, 2 oz. powdered rhubarb, and 6 oz. potassium nitrate. This tonic should be given in heaping tablespoonful doses three times a day in the food.

Good nursing is absolutely essential in treating these cases.

By adopting the above method of treatment very excellent results have been obtained during the past year in the inoculation of large numbers of valuable stud cattle. In several lots of from 10 to 40 head, although each animal had a most pronounced fever reaction, not one died.

GENERAL ADVICE.

The success of inoculation entirely depends upon several important factors, which, as a rule, are not readily adopted by a large number of stock-owners. However, the minimum of losses has occurred among cattle inoculated where the following rules have been strictly adhered to:—

1. Absolute cleanliness during the process of drawing the blood.
2. Using only perfectly disinfected instruments.
3. An egg-whisk should not be used for defibrinating the blood, as it is liable to break up the fibrin into small fragments.
4. Exposure for even a short period to the direct sun's rays is extremely detrimental to blood, and impairs its qualities for inoculation purposes.
5. It is advisable that, as dust is certain to arise in the stockyard during the operation of inoculating, the mouths of the bottles containing defibrinated blood should be kept well covered with several pieces of clean linen or calico, and kept in a cool, shady place.
6. (a) No more blood should be taken from an animal and defibrinated than can be used within six hours, for if kept longer the blood is apt to become contaminated with various kinds of bacteria, which are floating about in the atmosphere of the stockyard or shed, or other foreign matter, which, injected into an animal, might either produce blood-poisoning or an abscess.
(b) For general inoculation purposes, only use the blood from an animal that has given a decided reaction after an injection of either recovered or virulent blood.
7. Five c.c. of blood has been found to be a standard dose for animals of any age and either sex.
8. Inoculation should proceed steadily, care being taken to avoid all attempts at breaking records.
9. During hot summer weather inoculate only early in the morning and late in the afternoon.
10. (a) Never inoculate cows heavy in calf.
(b) It should be remembered that old bulls are the most susceptible of all animals; therefore, if there is no immediate danger from natural tick infection, it is inadvisable to inoculate them.
11. It is advisable, when inoculating on an extensive scale, to occasionally examine and test the needle and syringe, in order to see that they work freely, as a little piece of dirt or a hair will throw the valves out of order.
12. Cattle should be inoculated as near to their own pastures as possible, and in any case should, if inoculated some distance away, be allowed to travel back slowly without the aid of whips and dogs.
13. After inoculation, cattle should not be disturbed or interfered with in any way for at least three weeks.

14. During the cold weather in winter months it has been proved that blood can be carried with safety in well-corked clean bottles for from twenty-four to thirty-six hours either by rail, coach, or on horseback.
15. All the inoculating instruments, before and after use, should be thoroughly disinfected with 1 in 20 carbolic acid solution.
16. The rubber washers and plunger of the piston-rods should be thoroughly cleaned and washed in carbolic solution, and a little glycerine applied, which will prevent the rubber from becoming hard and deteriorating.
17. It is advisable in the latest form of syringe to soak the red rubber washers in warm water before use.
18. Never use vaseline or oil of any description on the rubber parts of the syringe. Glycerine is the best lubricant.
19. The needles and trocar after use should be well washed in boiled water, then rinsed in cyllin solution 1 in 400, carefully dried, and rubbed all over with a little vaseline.
20. Never disinfect any of the inoculating instruments with corrosive sublimate (bichloride of mercury) solution, as it readily corrodes the nickel plating.
21. The long pieces of rubber tubing when not in use should be kept under water, to which a few crystals of thymol have been added, in a large, well-stoppered, wide-mouthed jar.

Important Note.—It should be specially pointed out that repeated experiments have shown that some animals do not react to the first inoculation; therefore it is recommended that, wherever practicable, cattle should be inoculated a second time after an interval of not less than six weeks, for experience tends to prove that a second inoculation rarely ever fails. Moreover, by following this mode of procedure, stock-owners have the satisfaction of knowing that the possibility of their cattle not being immune to a subsequent attack of natural Tick Fever is reduced to a minimum.

PROFESSOR KOCH'S METHOD OF IMMUNISING CATTLE AGAINST RHODESIAN REDWATER.

(Abstract from Report dated 25th September, 1903.)

The process recommended is devoid of risk, and is inexpensive. For the present, I advise that it be only applied to animals exposed to imminent risk of infection, to infected herds, and to animals running on infected pastures, particularly to herds in which isolated cases of the disease have only recently occurred. The work of carrying out such inoculations should, when possible, be left to veterinary surgeons or to those who have been instructed in the method. The animals used for taking the blood intended for inoculation purposes should be in apparent good health and condition, and should be either animals which have recovered from an unmistakable attack of the disease, or animals which have survived an outbreak which has carried off the majority of their neighbours, and which have subsequently grazed for a long time upon veldt known to be highly infected, and, when, possible, the blood should be first microscopically examined before use, in order to determine whether the organisms usually found in the blood of recovered animals are present.

For the convenience of farmers and stockowners who are so situated that they cannot obtain the assistance of a veterinary surgeon, and who are unable to get an object lesson in the process of inoculating, the following directions are appended:—

To inoculate, the operator should provide himself with the following appliances:—

A lancet or sharp-pointed knife.

A trocar with canula about one-eighth of an inch in diameter, or a canula of this size pointed in the same manner as a hypodermic needle, to draw off the blood which is to be used for inoculating.

A wire egg-whisk, which has previously been cleaned by boiling or heating to redness in a fire.

A hypodermic syringe to contain 10 c.c., which should have previously been boiled along with the needles to be used for inoculating.

Two enamel pitchers to hold about half a gallon each, which have been rinsed first with a 5 per cent. solution of carbolic acid in water, and then washed out with boiled water.

A few pieces of freshly boiled clean muslin to strain the blood.

To prepare it for the operation of bleeding, it should be cast, its legs secured, and the head held down. The jugular vein is then raised by passing a strong cord round the base of the neck. The hair should then be clipped off over the vein and the skin washed with soap, using a 5 per cent. solution of Jeyes's fluid or carbolic acid in water; then make a small incision over the vein along its length, with the knife cutting through the skin, insert the trocar and canula into the vein, passing the trocar upwards in the direction of the head; withdraw the trocar, leaving the canula in the vein, and draw off the blood required into one of the enamel pitchers, stirring it all the time with the wire-whisk to prevent it from coagulating.

When a sufficient quantity of blood has been taken, the cord should be loosened from the neck and the canula withdrawn. The wound may then be closed by placing a piece of adhesive plaster over it, by putting a stitch through the skin on either side with a suture needle and suture silk, or by pinning the lips of the wound together with a pin, which should only pass through the skin, and then twisting a piece of silk around the pin figure-of-eight fashion.

After stirring the blood for ten or twelve minutes it should be strained through a piece of clean muslin into the other enamel pitcher, and carefully covered to keep out dust and flies; it will then be fit for use.

As a pint and three-quarters of strained blood is sufficient to inoculate 100 head of cattle, it will seldom be necessary to draw more blood from an animal at one time than three pints, which, when whisked up and strained, will give at least 1,000 c.c. suitable for inoculating with, although, if necessary, three or four quarts can be taken from an animal without injury. Every care should be taken to cleanse the site of the operation before bleeding, and the vein should be injured as little as possible when the trocar is inserted.

In cases of urgency, where a trocar and canula cannot be procured, the jugular vein may be raised in the ordinary way and the animal bled with a fleam, but by so doing there is more risk of damaging the vein than if a canula is used, and the blood is more likely to be contaminated.

To inoculate animals which it is desired to protect, the animal is secured, the syringe is filled with strained blood, the loose skin of the neck is gathered up between the thumb and forefinger; the needle of the hypodermic syringe is inserted under the skin, 10 c.c. are injected, the needle is withdrawn, the swelling caused by the injected blood is rubbed away gently with the hand, and the animal is released. The dose for all animals is 10 c.c., irrespective of age.

In the last report of Professor Koch on African Coast Fever, dated February, 1904, he "strongly recommends using 5 c.c. of recovered blood instead of 10 c.c.," thus agreeing exactly, so far as the quantity of recovered blood to be used is concerned, with what was recommended in Queensland in 1897.

The most salient points in Professor Koch's report are summed up in brief in the last but one paragraph:—

"Such expedients as fencing, dipping, spraying, and moving animals have only a temporary value, as sooner or later the disease will extend to and involve all the herds in the vicinity of an infected area. Therefore, such precautions should be supplemented by inoculation with recovered blood whenever disease appears in the vicinity."

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

STATIONS.	1906.		1907.										
	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
<i>North.</i>													
Bowen	0·99	11·01	2·53	3·74	1·97	0·39	3·46	2·87	Nil	1·28	0·51	0·06	3·71
Cairns	13·26	11·31	18·36	11·49	3·26	3·35	8·65	4·45	0·12	0·39	1·35	0·68	5·35
Geraldton	21·08	21·20	29·58	25·26	4·58	6·08	21·91	8·54	2·39	4·66	1·36	1·42	6·45
Herberton	5·16	10·82	10·56	11·77	2·05	0·90	1·57	2·71	Nil	0·11	0·12	0·17	3·41
Hughenden	0·51	4·76	1·98	3·83	1·17	0·16	1·34	0·95	1·16	Nil	Nil	1·66	0·66
Kamerunga State Nurs.	10·00	8·17	15·78	14·82	4·87	2·80	9·33	5·29	0·13	1·15	1·19	0·53	2·76
Longreach	0·66	0·51	1·22	0·49	1·88	0·85	0·93	0·40	0·49	0·04	Nil	1·08	2·83
Lucinda	6·60	*22·36	12·38	23·82	4·53	3·92	19·29	6·34	0·29	1·05	1·19	0·25	0·43
Mackay	1·80	12·93	2·72	6·42	8·01	1·58	*6·09	5·04	0·27	0·25	0·12	0·12	5·76
Rockhampton	0·46	5·19	4·15	4·42	3·05	0·44	0·94	4·16	0·84	0·47	Nil	0·47	3·72
Townsville	7·74	14·03	12·49	7·75	7·37	1·03	3·11	2·38	Nil	0·07	0·14	0·03	2·82
<i>South.</i>													
Barcaldine	1·33	1·04	3·44	0·43	1·51	0·82	0·34	2·03	0·87	0·06	Nil	1·21	1·54
Beenleigh	1·75	3·98	4·75	3·88	4·17	0·58	4·70	4·92	0·71	0·58	Nil	1·73	2·81
Biggenden State Farm	3·09	4·55	5·77	3·55	10·91	0·34	4·02	5·24	1·51	0·96	0·24	1·99	2·50
Blackall	1·37	1·96	2·30	Nil	2·78	1·69	0·20	0·36	1·36	0·06	Nil	0·88	0·80
Brisbane	1·07	3·28	2·69	5·23	5·32	0·45	4·75	2·91	0·39	0·79	0·10	1·37	4·25
Bundaberg	0·97	3·85	3·29	3·90	12·81	0·38	3·08	4·49	0·87	0·43	Nil	1·70	2·90
Caboolture	4·26	3·15	2·53	8·03	9·04	0·78	3·10	4·98	0·73	0·32	0·13	2·09	3·75
Charleville	1·30	3·71	0·85	Nil	2·75	2·29	0·26	0·90	1·04	0·76	0·02	1·69	3·88
Dalby	2·12	5·67	5·60	1·34	3·72	0·20	2·26	2·35	0·87	0·71	0·15	0·69	5·18
Emerald	2·32	1·79	7·36	3·67	7·66	Nil	Nil	2·53	1·75	0·10	Nil	0·98	1·84
Esk	2·45	5·26	2·87	6·79	3·60	0·22	5·42	2·66	0·54	0·81	0·57	0·50	3·76
Gatton Agric. College	2·01	3·45	2·62	6·44	2·71	Nil	2·80	1·85	0·54	0·56	0·15	0·71	3·01
Gayndah	4·25	2·82	3·00	1·91	6·89	Nil	2·65	3·00	1·21	0·53	0·40	0·34	4·65
Gindie State Farm ...	2·95	1·45	6·13	0·71	10·10	Nil	Nil	2·29	1·58	0·10	0·16	0·61	1·57
Goondiwindi	2·32	4·04	5·37	1·77	6·51	0·33	1·30	1·09	1·62	0·95	0·12	1·13	2·91
Gympie	4·12	5·32	3·99	6·96	8·93	1·12	3·84	3·77	0·80	0·17	0·47	1·20	3·05
Ipswich	0·71	4·22	2·17	5·38	1·95	0·12	3·43	2·22	0·30	0·43	0·05	0·78	4·45
Laidley	1·78	4·12	2·84	4·50	3·47	Nil	2·99	1·56	0·45	0·58	0·15	0·87	1·97
Maryborough	2·49	4·39	5·52	7·84	10·28	1·25	3·21	6·05	0·61	0·93	0·25	2·74	3·49
Nambour	3·40	6·74	5·74	12·05	13·30	1·36	4·64	6·96	1·08	1·13	0·60	1·38	2·98
Nerang	2·75	6·33	9·86	6·04	7·83	1·48	7·54	5·08	1·26	1·35	0·05	0·86	3·88
Roma	1·32	4·31	6·32	2·92	1·87	0·42	0·27	2·47	1·03	0·42	0·04	1·04	3·70
Stanthorpe	2·49	4·89	4·33	3·30	5·98	1·68	1·79	2·44	1·06	1·65	0·13	1·30	5·03
Tambo	1·23	1·16	4·74	1·41	3·58	3·69	0·11	0·89	1·42	0·09	Nil	0·68	2·03
Taroom	1·35	5·49	5·16	1·10	1·86	Nil	1·01	3·76	0·70	0·04	0·10	0·67	6·82
Tewantin	2·73	9·53	6·38	15·83	11·45	1·87	7·16	7·61	1·48	0·95	0·55	1·05	3·12
Texas	2·23	1·83	4·69	4·55	6·16	0·65	0·93	1·62	1·31	0·87	0·07	1·83	2·78
Toowoomba	2·65	4·11	3·94	4·00	4·81	0·01	4·61	3·34	0·91	0·65	0·17	1·58	5·12
Warwick	2·99	5·50	3·95	2·52	5·71	0·51	1·58	1·27	1·16	1·37	0·01	1·37	3·25
Westbrook	1·79	1·48	1·79	2·91	5·13	0·02	2·53	2·53	1·04	1·78	Nil	1·08	4·76

* Compiled from telegraphic reports.

GEORGE G. BOND,
For the Hydraulic Engineer.



General Notes.

THE BANDICOOT.

Mr. H. L. Poulsen gives us the following very interesting account of the omnivorous habits of the bandicoot. Most farmers who are troubled by the persistent attacks of this animal on seed corn, sweet potatoes, &c., have the idea that the bandicoot is a vegetarian. This is quite a mistaken impression. Mr. Hy. Tryon, Entomologist and Vegetable Pathologist to the Agricultural Department, says that the bandicoot is as much a flesh-eater as any other semi-vegetarian. Mr. Wild, Director of the Queensland Museum, says the same thing, and considers that Mr. Poulsen is quite right in stating that the animal is omnivorous, and he has no reason to doubt the latter's assertion that the animal he caught killing the chicken was a bandicoot. Mr. Poulsen's communication, which will come as a surprise to many farmers and poultry-breeders, is as follows:—

Several months ago there appeared in the Journal directions for making a bandicoot trap, and the writer volunteered the information that the bandicoot is a vegetarian. I have been waiting for a contradiction of that statement, as I consider that it must be classed as omnivorous. In this district it is credited with being the cane-growers' best friend, in that it largely subsists on the grub of the cane beetle, and the many small excavations about the stools of grub-infested cane bear evidence to its utility. This may be considered as merely circumstantial evidence, but I have better proof that it does not confine itself to a vegetable diet. Being without a dog on the farm, I found a sitting hen was disturbed of a night and the eggs disappearing by degrees. To stop this I chipped a small hole in an egg, inserted a little strychnine, and pasted a bit of paper over the opening. The following morning I found a dead bandicoot close to the nest, and the poisoned egg had disappeared. One night lately I had occasion to go out with a storm lamp, and actually surprised a bandicoot in the act of killing a chicken. If any of your readers is still in doubt about the diet of this animal, then he will find on examination that it is provided with large canine teeth. As a friend of the cane-grower it ought to be protected in the sugar districts.

[As regards the canine teeth, Mr. Tryon describes them rather as the two great gnawing teeth of the wallaby, not the true canine teeth of a carnivore.—Ed. "Q.A.J."]

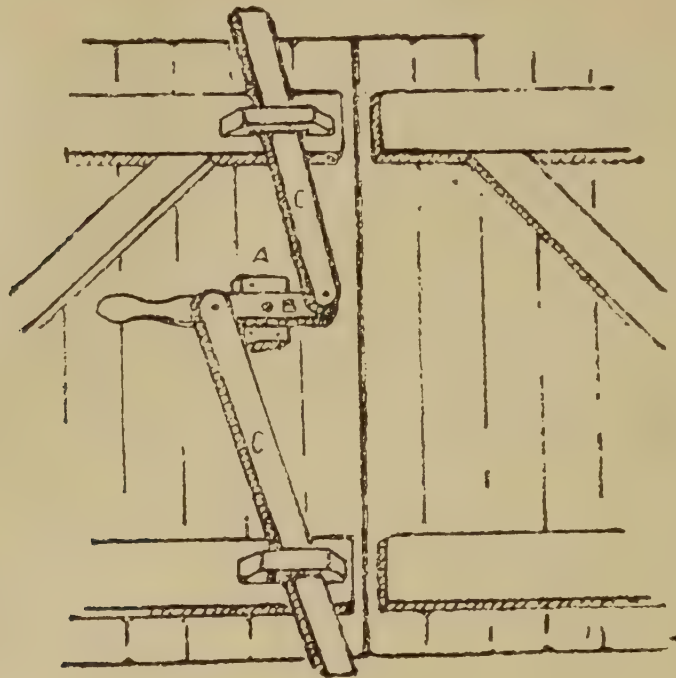
COCOANUT BEETLE.

From the thirty-fourth report of the Ceylon Agricultural Society, published in the "Tropical Agriculturist," we take the following suggestion for the trapping of cocoanut beetles, which will doubtless interest many of our readers in Papua and the Solomon Islands who are engaged in cocoanut-growing:—

Cocoanut Beetle.—The Ratemahatmaya of Demala hatpattu, in a letter to the Government Agent, North-western Province, suggests an easy and effectual way of destroying cocoanut beetles. He says: "Take a quantity of castor seed, say, about four measures, pound and extract the oil by boiling with water as is done with the cocoanut, remove the oil for use, put the water and the sediments into an earthen vessel with a large mouth, and leave it under a tree on the estate, taking care to close it up during rainy weather. The beetles in the neighbourhood will be attracted to the vessel, fall into it, and die."

DOUBLE DOOR-FASTENER.

For well securing a double barn door (says the "Farmer and Stock-breeder") or any other double door, an effective and economical device is depicted in the accompanying illustration. B is a lever 16 inches long. A hole is bored at B for attachment by bolt to the block A. The latches CC are



attached to the lever at either side of B, so that an upward movement of the lever removes the bolts CC, while a downward movement forces them into the mortises in the sills provided for them. The latches should be made and attached to the door before the mortises are made, a plan which will shorten and simplify the arrangement of fitting.

ENSILAGE MAKING.

Dr. Cherry, Director of Agriculture in Victoria, says in regard to the above:—"The best ensilage is made from plants with a solid stem, such as maize, sorghum, or amber cane, while with these crops there is the further great advantage that the whole of the stem, if the material is chaffed, becomes so soft and succulent that none is wasted by the animals. Considering also the total yield per acre, there is no question that where a crop is specially grown for silo one of these should be chosen.

"The hollow stem of cereals contains air, and this increases the loss by fermentation, even when chaffed; but, in spite of this defect, there is no better way of utilising a crop of rye or barley grown for fodder which has become over-ripe to be relished by the cows. If other methods of securing green fodder are available, oats, wheat, and the mixed grasses and clovers are better made into hay. A mixture of peas, beans, tares, or clover, with maize or cereals, greatly increases the food value of the silage, and, according to Canadian experiments, 1 acre of sunflowers with 2 acres of tick beans and 4 acres of maize makes a very satisfactory balanced ration for the dairy cow.

"Ensilage should contain 75 to 80 per cent. of water—that is, most crops should be siloed when the flowers are all out and the grain well formed. An exception occurs in clover, trefoil, and lucerne, which should be cut when in full bloom and allowed to wilt one day before filling into the silo. Generally speaking, a crop is ready for the silo a little earlier than it is for hay. Maturity is very important in the case of maize and similar crops which mature rapidly after the cobs are formed. Immature maize contains little nutriment."

An English writer says:—There is no better way to make a boy stick to the farm than to give him a few sheep and teach him how to care for them, and allow him the proceeds from his little flock. You will be out very little, and you will be surprised how much he will make on the small investment compared with some of his father's larger investments.

It has been found that 36 lb. of sheep manure is equal as a fertiliser to 100 lb. of ordinary farmyard manure, being richer in nitrogenous substances than that of the cow or horse, ranking next in ammonia, and richer in the phosphates than guano or the droppings of fowls. In the face of such conclusive and indisputable evidence, why will farmers neglect to keep a few sheep?

The area of any piece of land containing more than five sides may be obtained by turning the shape into a single triangle, and more accurately than by cutting a plan into numerous triangles.

A piece of land, $ABCEFG$, is to be measured. Take A as the apex of the triangle. Draw a dotted line from A to C , C being the innermost point on the right side. Then draw BH parallel to AC , cutting the extended base at H . Draw the line AH , which is one side of the triangle to be constructed, and which exactly halves the parallelogram $ACHB$. Now draw AE , E being the innermost point, and draw FI parallel to AE , F being the outer-

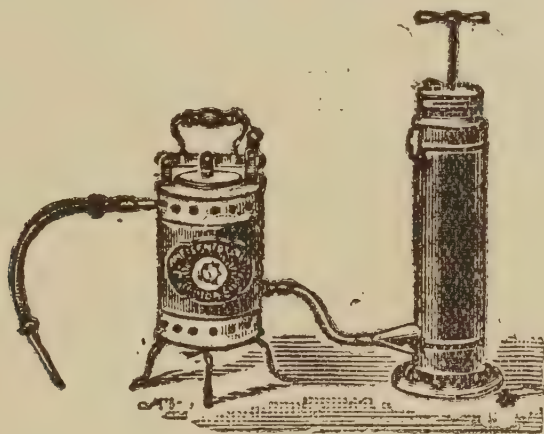
Scale, 10 chains to 1 inch.

Take a still more irregular plan, with more than five sides, such as A B C D E F G H I. Take the longest side for a base, and extend its length indefinitely. Then take parallel rulers and lay them from the highest or the next point, as shown by the dotted line A to F, and run the dotted line D M,

A WHITE ANT EXTERMINATOR.

In the "Natal Agricultural Journal" for July, 1906, Mr. Claude Fuller, Government Entomologist, illustrates and describes a machine for the destruction of white ants, placed on the market in South Africa by Messrs. P. Henwood, Soutter, and Co., agents for the sale thereof.

This contrivance consists of an air-pump, connected by a short length of rubber hose to a furnace. By working the pump a continuous blast of air is driven into the furnace, entering beneath and escaping through a pipe near the top—shown to the left of the illustration—to which is attached a flexible iron hose. A charcoal or cow-dung fire is first started in the furnace, and, by pumping, got thoroughly alight. A powder is then sprinkled over the fire and the lid closed. By continuing the pumping a very hot cloud of poisonous smoke is driven out through the flexible hose. In use, the nose is inserted into a gallery of an ant's nest and the smoke pumped in.



Having had one of these machines in use for the past three or four months, I have no hesitation in saying that in the "Universal Ant Exterminator" we have the most efficient and effective apparatus for destroying white ants in their nests which has yet come under notice. Upon many occasions I have succeeded in killing out huge colonies—nests 15 and 20 feet across—where I have previously failed to destroy the lot. Treated nests which have been dug out reveal the death of every inhabitant, and show deposited upon the walls of every chamber and gallery a poisonous coating.

Two rather unique cases in the use of the pump are worth recording. In the first case a white-ants' nest was discovered beneath the flooring of a farmhouse and dug out. Later, I loaned the machine to the owner in order that he might test its efficiency. White ants were noticed working at the mouth of a gallery 80 feet away from the house. Here the fumes were pumped in, and a few minutes later a cloud of smoke issued through the flooring of the room from beneath which the nest had previously been dug out. The gentleman to whom the machine was loaned has since purchased two, and is now working over the whole of an estate of 5,000 or 6,000 acres.

In the second instance honey bees had become a decided nuisance, making their nests between the lining and the roofing of a large veranda. Auger holes were bored through the ceiling boards, and the smoke pumped in through a length of iron piping. The immediate result was to drive out the bees through every exit hole they knew of. Many dropped dead, but the great majority escaped alive. Afterwards, of course, the bees returned, and, naturally enough, started to work cleaning away the deposit; this poisoned them off.

Wherever a gallery, sufficiently large to admit the nose of the hose, can be obtained (about half an inch in diameter), the machine can be used with the most satisfactory results; not only are the insects killed, but the gallery is thoroughly poisoned for an indefinite period.

The powder spoken of is sold with the pumps. A cheaper and equally effective powder can be obtained by farmers at the Department of Agriculture, Maritzburg, at 8d. per lb.

Answers to Correspondents.

GANGRENOUS MASTITIS.

JAS. ARMSTRONG, Junr., Archer Siding.—

Your cows are suffering from *gangrenous mastitis*, due to organisms that gain entrance through the teat or through small wounds of the udder. Any cause that will induce ordinary inflammation of the udder, such as bad milking, &c., will, if the necrosis and putrefactive organisms are present, induce gangrene.

Treatment.—Isolate all cows whose udders are affected, and the man who milks these cows should not be allowed to touch the healthy ones. The milker's hands, the udders of the affected cows, the ground of the bail where the sick cows are milked, and the vessels in which the milk is collected should be thoroughly disinfected with one of the following disinfectants:—

Corrosive sublimate solution, in water, in the proportion of 1 to 1,000; lysol, 2 per cent. solution, in water; carbolic acid, 5 per cent.; creolin or cyllin, $2\frac{1}{2}$ per cent.; Little or Quibell's fluid sheep dips, $2\frac{1}{2}$ per cent.

The milk of the affected cows should be mixed with some of the disinfectant and thrown away.

The ground of the milking-shed might be sprinkled with lime with advantage. The affected cows should be thoroughly stripped out, and the udder injected by means of a teat syphon and a syringe with a solution of chinosol in the proportion of 15 grains of chinosol to a pint of warm water. About half a pint should be injected into each quarter, and the fluid thoroughly distributed by manipulating the udder for 10 or 15 minutes. The udder should then be stripped out, and the operation repeated about three times daily.

After being removed from an affected quarter the teat syphon should be placed for a minute or two in one of the solutions of disinfectant recommended above.

When there are signs of mortification of some part of the udder, denoted by coldness, greenish colour, and foul odour of the part, the dead part should be cut away with a knife, the knife passing through the healthy tissue around the dead part. The bleeding may be stopped by the application of a hot iron and the wound dressed with Stockholm tar.

If any of the larger milk veins have to be cut, it is first necessary to ligature them by passing a piece of silk under the vein by means of a needle, and then tying the silk around the vessel.

Internally.—The cow may be given 6 oz. of Epsom salts daily in a quart of gruel and beer.

COTTON-PICKERS.

COTTON, South Coast Line.—

A reasonable quantity for a young cotton-picker is 80 lb. a day. Experienced pickers will regularly bring in 100 lb., and exceptionally quick, experienced hands frequently average 200 lb. a day. In the West Indies, in Egypt, and in the United States, during the early ripening season, only very few are required, but later, when the crop is maturing rapidly and large quantities are ready for gathering at the same time, the number of pickers is considerably increased for a short time; later still, the number may be again decreased. In the height of the season one picker per acre is quite sufficient. On some estates, no more than one picker to 3 acres is ever employed. The greater number of pickers is required where Sea Island or Egyptian cotton, and probably Caravonica, are planted. As far as Queensland experience goes, one picker can easily manage 5 acres of Upland cotton, and one grower in the Central district says he can pick a 10-acre crop without employing extra hands.

THE CAMPBELL DRY-SOIL SYSTEM.

CEREAL, Kingaroy.—

The storage and conservation of rain waters by adopting a system of cultivation at the right time to allow for and induce percolation of moisture, and its subsequent retention in the soil by checking evaporation by means of a blanket mulch.

Pulverising and packing of the sub-surface to form a seed and root bed; to increase its water-holding capacity, and to assist the capillary movement of moisture. Constant stirring of the surface to ensure reception and retention of moisture.

Briefly, for new land, the methods to be as follows:—

Breaking-up: Plough shallow, say 2 inches, preferably in spring. Land must be moist. Turn sod completely over. Then roll. Follow with Acme or common harrow, to thoroughly pulverise land free soil from sod, so as to fill in all interstices and second a good blanket mulch. Harrow after each rain.

When soil beneath blanket is rotted and moist, say January or February, thoroughly pulverise by double discing—i.e., lapping one-half each round. Plough with stirring or stubble plough, cutting about $2\frac{1}{2}$ inches to 3 inches deeper than the first ploughing; follow with sub-surface packer, and harrow down fine either with Acme or ordinary tine harrow. It is absolutely essential to pack and harrow the morning's ploughing before going to dinner, and treat the afternoon's work similarly.

Land should not be allowed to crust or become weedy, and must be periodically stirred after each rain; failing rain, observe whether the soil below mulch is becoming dry; if so, cultivate again. In fact, the surface must be kept stirred to ensure proper protection of moisture. For hot weather, the mulch should be made deeper as an additional protection—say, fully 3 inches. Under favourable circumstances, land broken up, say in August, may, after above described treatment, be sown with wheat in May, but it is preferable to ensure that at least twelve months' rain is stored in the cultivated land before cropping.

From available information it is gathered that a year's preparation at least should be made for conserving moisture, although exceptions have been given when by ploughing, with subsequent operations, in the early spring of one year, the land has been cropped by seeding down with wheat or spring crops.

PLOUGHING IN COWPEAS.

F. E. EGGAR, Yandaran.—

Opinions differ as to the proper time to plough in cowpeas, some affirming that it should be done when the plants are in flower, others maintaining that the seed pod should first have formed. The whole business of green manuring is based on a philosophical knowledge of the nature of plants, and will repay careful examination.

In the first place, the seeds of plants are sown which, like cowpeas, clover, lupines, &c., have a peculiar faculty for profiting by the food which they find in air and deep in the subsoil; or plants are chosen which, like the above, or like buckwheat or rye, have the power of extracting nourishment from the earth, even under very unfavourable conditions. These plants are allowed to grow until they have gathered from the soil all the matters they are capable of gathering—that is to say, the plants are left *until they are in flower*—and then they are ploughed under. By operating in this way the land is manured with everything that the plants have accumulated, either from the air or from the soil, or from the waters in the soil, and there is placed within the land a mass of organic matter which, by its decay, will give off enormous quantities of carbonic acid to disintegrate and dissolve the components of the crude soil.

There is one danger which must be kept in view and guarded against when possible. On light land serious trouble might ensue if a drought should set in immediately after a green crop has been ploughed under. For, unless there be moisture enough in the soil to rot the buried plants, the field would be left in a bad condition. In case of need, the land should be rolled after the ploughing, and even cultivated a little on the surface, to prevent the moisture from drying out from the rolled earth. An acre of well-grown cowpea will amount in weight to from $1\frac{1}{2}$ to $2\frac{1}{2}$ tons, and when this mass is turned under it gives up 64 to 70 lb. of nitrogen, 21 to 25 lb. of phosphoric acid, and from 100 to 130 lb. of potash. The most barren soils may eventually be rendered fertile by green manuring with velvet bean or cowpeas. It is merely a question of time. It is a question of the highest importance how to retain this nitrogen, which is the most fugacious element in the whole list of fertilisers. Ploughing under, even is not a positive guarantee of the retention of the nitrogen, since all varieties of soil seem to have slight affinity for nitrogen, and it is left to evaporate or wash away in the waters of drainage.

The only sure expedient, therefore, is to plant another crop to hold the fleeting element until spring, by absorbing it into its own tissues. This retaining or cover crop may be rye, oats, or winter vetch, and the latter is, in some respects, the best of the three, because it is a legume itself.

The lasting effect of a crop of cowpeas ploughed under will depend on the amount of nitrogen contained in the green manure and the amount abstracted from the soil by the crop grown. If maize be sown after cowpeas, two crops might be taken off before refertilising. With sugar-cane, as in your case, the matter is different, as the cane would not be ploughed out until probably the third or fourth ratooning; therefore, other means would have to be adopted after the green manure is exhausted. Cowpea can be ploughed under in from four to four and a-half months after sowing; 9 lb. of seed are required per acre, and sowing may be done from the beginning of spring to New Year.

Read the article on cowpeas by H. A. Tardent in the issue of this Journal for March, 1907.

PEACH-LEAF POISON BUSH.

INQUIRER, N.C. Line.—

The specimen you sent for identification is the *Trema aspera*, or Peach-leaf Poison Bush, so called, although Mr. F. M. Bailey, Colonial Botanist, does not consider it contains any poison. If stock eat it combined with other fodder it will do little harm, but if fed on nothing else it will probably kill them, owing to its containing a tough, fibrous substance, which causes indigestion, with often fatal results.

AQUATIC GROWTH IN WELL WATER.

POULSEN, Childers.—

If the tank is an open iron tank, it is generally sufficient to cover it up to prevent the growth of vegetable matter. Algæ may be easily destroyed by adding to the water a minute quantity of copper sulphate—about 1 oz. of copper sulphate (blue vitriol) per 3,000 gallons of water.

EXTERMINATING RATS.—COVERING AN ENSILAGE STACK.

I. P. FALLON, Greenmount.—

1. The lye is made of caustic soda. Mix it with molasses to the consistency of a paste. Smear on a board, and place the board near the rat hole. All that is needed is for the rats to run over the smeared surface of the board. The lye sticks to their feet and burns them. Then they lick their feet, after which they will cease from troubling you.

2. It is always advisable to cover an unfinished ensilage stack in the event of heavy rain occurring. There is quite sufficient moisture in the green crop without adding more to it.

Publication Received.

DE-NATURING ALCOHOL.

What does de-naturing alcohol mean? To the majority of persons alcohol means liquor—something to drink—but few know that, beyond its use as a stimulant, and to some extent in the arts and as a fuel, it is also a source of power as a substitute for gasolene, petroleum, and kindred hydrocarbons. When the De-naturing Act was passed by the last American Congress, alcohol leaped into fame, not as an intoxicant, or as the humble servant of a lamp, but as a new farm product.

On this subject we have received from Messrs. Spon and Chamberlain, publishers, New York and London, the second edition of "A Practical Handbook on the Distillation of Alcohol from Farm Products, including the De-naturing of Alcohol for use in Farm Engines, Motors, Heating, Lighting, &c.," by F. B. Wright. This work is well worthy of perusal, is profusely illustrated, and deals with every phase of the business and science of distilling from various farm products, such as potatoes, barley, wheat, maize, rice, beets, molasses, &c. The book is published at 4s. 6d. net, and can be had from any of the leading booksellers in the Australasian colonies, or from the agent, Geo. W. Kettlewell, 273 George street, Sydney.

Times of Sunrise and Sunset at Brisbane, 1908.

DATE.	JANUARY.		FEBRUARY.		MARCH.		APRIL.		PHASES OF THE MOON.
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	
1	4.56	6.45	5.20	6.42	5.41	6.20	5.57	5.46	4 Jan. ☉ New Moon 7 43 a.m. 10 " ☾ First Quarter 11 53 p.m. 18 " ○ Full Moon 11 37 " 27 " ☾ Last Quarter 1 1 a.m.
2	4.57	6.46	5.21	6.42	5.41	6.19	5.58	5.45	
3	4.58	6.46	5.22	6.41	5.42	6.18	5.58	5.44	
4	4.58	6.46	5.23	6.41	5.43	6.17	5.59	5.43	
5	4.59	6.46	5.23	6.40	5.43	6.16	6.0	5.41	
6	5.0	6.47	5.24	6.40	5.44	6.15	6.0	5.40	
7	5.0	6.47	5.25	6.39	5.44	6.14	6.1	5.39	
8	5.1	6.47	5.26	6.38	5.45	6.13	6.1	5.38	2 Feb. ☉ New Moon 6 36 p.m. 9 " ☾ First Quarter 2 27 " 17 " ○ Full Moon 7 5 " 25 " ☾ Last Quarter 1 24 "
9	5.2	6.47	5.26	6.38	5.45	6.11	6.2	5.37	
10	5.2	6.47	5.27	6.37	5.46	6.10	6.2	5.36	
11	5.3	6.47	5.28	6.36	5.46	6.9	6.3	5.35	
12	5.4	6.47	5.29	6.36	5.47	6.8	6.3	5.34	
13	5.5	6.47	5.29	6.35	5.47	6.7	6.4	5.33	
14	5.6	6.47	5.30	6.34	5.48	6.6	6.4	5.32	
15	5.6	6.47	5.31	6.33	5.49	6.5	6.5	5.31	3 Mar. ☉ New Moon 4 57 a.m. 10 " ☾ First Quarter 7 42 " 18 " ○ Full Moon 0 28 p.m. 25 " ☾ Last Quarter 10 32 "
16	5.7	6.47	5.31	6.33	5.49	6.4	6.5	5.30	
17	5.8	6.47	5.32	6.32	5.50	6.3	6.6	5.29	
18	5.9	6.47	5.33	6.31	5.50	6.2	6.6	5.28	
19	5.10	6.47	5.34	6.30	5.51	6.1	6.7	5.27	
20	5.10	6.47	5.34	6.29	5.52	5.59	6.7	5.26	
21	5.11	6.46	5.35	6.28	5.52	5.58	6.8	5.25	
22	5.12	6.46	5.36	6.28	5.53	5.57	6.8	5.24	1 Apr. ☉ New Moon 3 2 p.m. 9 " ☾ First Quarter 2 32 a.m. 17 " ○ Full Moon 2 55 " 24 " ☾ Last Quarter 5 7 "
23	5.13	6.46	5.36	6.27	5.53	5.56	6.9	5.23	
24	5.14	6.46	5.37	6.26	5.54	5.55	6.9	5.22	
25	5.14	6.45	5.38	6.25	5.54	5.54	6.10	5.21	
26	5.15	6.45	5.38	6.24	5.54	5.53	6.11	5.20	
27	5.16	6.45	5.39	6.23	5.55	5.52	6.11	5.20	
28	5.17	6.44	5.39	6.22	5.55	5.50	6.12	5.19	
29	5.18	6.44	5.40	6.21	5.56	5.49	6.12	5.18	
30	5.19	6.43	...	...	5.56	5.48	6.13	5.17	
31	5.19	6.43	...	...	5.57	5.47	...	...	

The Markets.

PRICES FOR FRUIT—ROMA-STREET MARKETS.

Article.					DECEMBER.
					Prices.
Apples, Eating, Local, per packer	...	...	...	...	4s. to 6s.
Apples, Cooking, Local, per packer	...	...	...	...	8s.
Apples, Tasmanian, Cooking	...	...	...	...	14s.
Apricots, Local, per packer	...	...	...	...	4s. to 4s. 6d.
Bananas, per dozen	...	...	...	...	2½d. to 4d.
Bananas, Local, per bunch	...	...	...	...	...
Cherries, per quarter-case	...	...	...	...	3s. to 7s. 6d.
Custard Apples, per quarter-case	...	...	...	...	...
Grapes, per lb.	...	...	...	...	4d. to 7½d.
Lemons, Local, per packer	...	...	...	...	6s.
Mangoes, per case	...	...	...	...	4s. to 6s.
Nectarines, per quarter-case	...	...	...	...	...
Oranges, per packer	...	...	...	...	9s. 6d.
Papaw Apples, per case	...	...	...	...	...
Passion Fruit, per quarter-case	...	...	...	...	2s. to 3s.
Peaches, per case	...	...	...	...	1s. 6d. to 2s. 6d.
Peanuts, per lb.	...	...	...	...	...
Pears, Imported, per case	...	...	...	...	...
Persimmons, per case	...	...	...	...	...
Pineapples (rough leaf), per dozen	...	...	...	...	6d. to 2s. 6d.
Pineapples (smooth leaf), per dozen	...	...	...	...	3s. 6d.
Plums, quarter-case	...	...	...	...	2s. 6d. to 5s. 6d.
Quinces, per case	...	...	...	...	...
Rockmelons, (large), per dozen	...	...	...	...	4s. to 5s. 9d.
Rosellas, per bag	...	...	...	...	...
Rosellas, per quarter-case	...	...	...	...	...
Strawberries, per tray	...	...	...	...	...
Tomatoes, per quarter-case	...	...	...	...	9d. to 2s. 8d.
Watermelons, (large), per dozen	...	...	...	...	8s. to 10s. 6d.

SOUTHERN FRUIT MARKET.

Apples, Tasmanian, per case	...	...	...	...	...
„ American, per case	...	...	...	...	...
Apricots, per quarter-case	...	...	...	...	...
Bananas, Fiji, per case	...	...	...	...	13s. to 13s. 6d.
„ „ per bunch	...	...	...	...	4s. to 7s.
„ Queensland, per bunch	...	...	...	...	2s. 6d. to 6s. 6d.
„ „ per case	...	...	...	...	12s. 6d. to 13s.
Cherries, per quarter-case	...	...	...	...	...
Gooseberries, Tasmanian, per quarter-case	...	...	...	...	...
Lemons, Ordinary, per gin case	...	...	...	...	...
Loquats, per box	...	...	...	...	...
Mangoes, Queensland, per case	...	...	...	...	3s. to 5s.
Mandarins, Queensland, in Melbourne, per case	...	...	...	...	...
Oranges, Queensland, in Melbourne, per case	...	...	...	...	...
Oranges, Common, per case	...	...	...	...	...
Oranges, Navel, per case	...	...	...	...	...
Pears, Victorian Vicars, per box	...	...	...	...	...
Passion Fruit, per quarter-case	...	...	...	...	4s. to 5s.
Peaches, per case	...	...	...	...	...
Pineapples, Queensland Queen's	...	...	...	...	8s. to 10s.
Pineapples, Choice (Common)	...	...	...	...	8s. to 10s.
Pineapples, Medium	...	...	...	...	5s. to 7s.
Tomatoes, Choice Queensland, per quarter-case	...	...	...	...	3s. to 4s. 6d.
Tomatoes, Others, per quarter-case	...	...	...	...	2s. to 3s.
Watermelons, Queensland (large), per dozen	...	...	...	...	15s. to 18s.
Watermelons, (small), per dozen	...	...	...	...	8s. to 10s.

Farm and Garden Notes for February.

FIELD.—The land intended for potatoes should now be ready for planting. Plant sound small potatoes, well shot, without cutting them. If large potatoes are cut into setts, there is a risk of their rotting, as the usual wet weather may be expected, with a hot, muggy atmosphere. Weeds will be very troublesome, and for that reason the sowing of lucerne should be deferred till later. Sow lucerne in deep rich soil, thoroughly worked and deeply ploughed. Cape barley, panicum, Kafir corn, imphee, sorghum, and vetches may be sown, but it is risky to plant maize for a late crop, as early frosts would destroy the ripening grain. For an early winter crop sow swede turnips and mangelwurzels.

KITCHEN GARDEN.—Make preparations for good crops of vegetables for the early winter by ploughing or digging all unoccupied land, supplying well-rotted manure if needed. Chicken guano is also an excellent fertiliser if prepared as follows:—

Spread a layer of black soil on the ground. Dump the fowl manure on to this and pound it fine with the back of a spade; add hardwood ashes so that the compound shall contain: Soil, 3 bushels, fowl manure, 2 bushels; ashes, 1 bushel. Mix thoroughly, and a little before planting moisten the heap with water, or, better still, with urine; cover with old mats, and let it lie till needed.

Most market gardeners will have cabbages and cauliflowers ready for transplanting. Do this during the month. Read the article in the December number of the Journal, on the growing of cabbages and cauliflowers, in which it is recommended to sow the seed from the middle of January to the middle of March, arranging the time, however, to suit early and late districts. For winter crops the Drumhead type, of which Flat Dutch and Queensland or Florida Headen are good examples, are the most profitable. The Savoy cabbage does well here. The best cauliflowers to grow are the Large Asiatic, Eclipse, Early Dwarf, and Le Normand. If the aphid appears, spray with tobacco solution.

Sow French beans, butter beans, beet, carrot, turnip, radish, cabbage, cauliflower, cress, peas. Should the weather prove dry after the January rains, give the plants a good soaking with water. Gather all fruit of cucumbers, melons, French and other beans, and tomatoes as they ripen, to ensure the continued production of the vines and plants.

FLOWER GARDEN.—Thin out, and tie up dahlias. Keep the weeds down, and never allow them to seed. Sow hardy annuals. This is the best month for sowing, as you will be able to keep up a succession of bloom during the succeeding months of autumn and winter. To ensure this, sow phlox, pansy, daisy, stocks, aster, nasturtium, hollyhock, candytuft, mignonette, sweet peas, dianthus, carnations, cornflower, summer chrysanthemum, verbenas, petunias, penstemons, &c. Dianthus, sown now and planted out in March, will bloom during the whole year if the dead stalks and blooms are regularly cut away.

Do not sow flower seeds too deep, as on the depth will depend greatly what results you will have as regards the seed germinating. It is easy to remember that seeds should be covered with fine soil to a depth equal to their own size—for instance, a pea is about one-eighth of an inch in diameter—therefore, cover it with one-eighth of an inch of soil.

Orchard Notes for February.

By ALBERT H. BENSON, M.R.A.C.

In order that the series of Monthly Notes that have appeared for some years past in the "Agricultural Journal" may be of more value to our fruit-growers, I take the advantage of this, the commencement of a new year and new volume of the Journal, to revise them and bring them up to date. At the same time I purpose altering the notes somewhat, as, instead of making them of a general nature, applicable to the whole of the State, I will endeavour to localise them to a certain extent, as, in my opinion, although the general principles of cultivation, manuring, pruning, treatment of fruit pests, as well as of the handling and marketing of the fruit, are applicable to the State as a whole, there are many matters that are of interest to individual parts of the State rather than to the whole State; and, further, notes that are applicable to the Southern part of the State for one month are not always applicable to the North for the same month.

In order to carry out this idea, I propose to divide the State as follows:—

1. The Southern Coast Districts, south of the Tropic of Capricorn.
2. The Tropical Coast Districts.
3. The Southern and Central Tablelands.

THE SOUTHERN COAST DISTRICTS.

The earlier summer fruits, including grapes, will be pretty well over, but pineapples, mangoes, and bananas are in full fruit. The bulk of the main summer crop of pines ripens during the month, and growers are in consequence kept very busy sending them to both our local markets and canneries and to the Southern States. The planting of all kinds of tropical fruits can be continued where necessary, though earlier planting of both pines and bananas is to be recommended. Still, if the land is thoroughly prepared—viz., well and deeply worked—they can be planted with safety, and will become well established before winter. The month is usually a wet one, and both tree and weed growth is excessive. If unable to get on the land with horses to keep down weed growth, use the scythe freely in the orchard before weeds seed, as by doing so you will form a good mulch that will tend to prevent the soil washing, and that, when ploughed in later on, will add a considerable quantity of organic matter to the soil, thus tending to improve its mechanical condition, its power of absorbing and retaining moisture as well as to increase its nitrogen contents.

This is the last month of the year in which to bud mangoes in the Brisbane district. The bark of the stock to be budded must run very freely, and the scion when placed in position must be tied very firmly. The bark of the scion should be slightly thicker than the bark of the stock, so that the material used to tie it keeps it firmly in its place. As soon as the bud is tied, ringbark the stock just above the bud, so as to force the sap of the stock into the scion, so that a union will take place quickly.

Where cyaniding of citrus and other trees has not been concluded, it may be continued during the month, as fruit treated soon will probably keep clean and free from scale insects till gathered. If the trees have been treated with Bordeaux mixture, do not cyanide, as cyaniding should always be done previous to spraying with Bordeaux mixture.

If Maori is showing, spray with the sulphide of soda wash. Look out for Black Brand, and also for the Yellow Peach moth towards the end of the month in the earlier districts. Spraying with Bordeaux mixture is advisable in the case of both of these pests.

Get land ready for strawberry planting, so as to be ready to set out runners next month. Some growers set out plants as early as the end of February, but I prefer March. Citrus and deciduous trees can still be budded during the month. Young trees in nursery should be kept clean and attended to; ties should be cut when necessary, and the young trees trained to a straight single stem.

THE TROPICAL COAST DISTRICTS.

As the month is usually a very wet one in this part of the State, very little work can be done in the orchard other than keeping down excessive weed growth by means of a scythe. When citrus trees are making excessive growth and throwing out large numbers of water shoots, the latter should be cut away, otherwise they are apt to rob the rest of the tree and thus injure it considerably. Many of the citrus trees will come into a second blooming during the month, and this will produce a crop of fruit ripening towards the end of winter and during the following spring. The main crop, when same has set in spring, will be ripening towards the end of the month, but, as a rule, insect life of all kinds is so prevalent at this time of year that the bulk of the fruit is destroyed. Where there is sound fruit, however, it will pay to look after. If the weather is wet, the fruit should be artificially dried before packing, but if there are periods of sunshine then the fruit can be cut and laid out on boards or slabs in the sun, so that the extra moisture of the skin can be dried out. Care will have to be taken not to sun-scald the fruit or to dry it too much, all that is required is to evaporate the surplus moisture from the skin so that the fruit will not speck when packed.

Tropical fruits of all sorts can be planted during the month. Budding of mangoes and other fruits can be continued. Bananas must be kept netted, as fly is always bad at this time of year.

SOUTHERN AND CENTRAL TABLELANDS.

The marketing of later varieties of apples, pears, plums, peaches, and nectarines will occupy the attention of the Stanthorpe growers. The grape harvest will also extend right through the month. Every care should be taken to see that the fruit fly and Codling moth are not allowed to spread, although the best work in fighting these pests has to be done during the months of December and January, as on the action then taken, if carried out systematically, the freedom of the later fruits from infestation mainly depends.

Handle the fruit carefully, and see that no fly or Codling moth infested fruit leaves the district. The grapes, ripening as they do when this fruit is over in the earlier parts of the State, should be sent not only to Brisbane but to all other parts of the State. For long shipment nothing can beat crates holding six 6-lb. baskets. The fruit should be gathered some hours before packing, and be placed in the sun so as to become thoroughly dry and to allow the stems to become wilted, as this causes the fruit to hang on the bunch much better, and consequently to reach its destination in better order.

If parrots and flying foxes are troublesome, organised shooting parties or poisoning with strychnine are the best means of dealing with these pests.

The crop of grapes will be about over in the Roma and other inland districts. Citrus trees, where infested by red scale, should be cyanided. The orchard should be kept well cultivated after every rain, and when there is no rain but water is available for irrigation, if the soil requires it, the trees should get a good soaking, which, if followed by thorough cultivation, will carry them on till the fruit is ripe.

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It is hereby notified that the *Journal* will be supplied to all members of Agricultural and Horticultural Societies who do not derive their livelihood solely from the land, on payment, in advance, of an annual subscription of 5s., which will include postage. Schools of Arts will be supplied at the same rate.

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Agriculture.

No. 4.—MARKET GARDENING.

By A. J. BOYD.

LEEKs AND ESCHALOTS.

To grow leeks successfully, the soil must be rich, deep, well dug, and manured with well-decomposed manure. Sow the seed in April and May, in drills 6 inches apart and $\frac{1}{2}$ -inch deep. When about 8 inches high, transplant them into a bed previously prepared for them by being deeply dug and heavily manured. Shorten the roots to about 1 inch from the plant, and cut off 2 inches or more from the extremity of the leaves. Make drills 15 inches apart and 6 inches deep, and plant them with a dibble deep in the bottom of the drill, nearly up to the leaves, at a distance of 8 inches apart. Cut back the leaves once a month during their growth, to make their necks swell out. As the plants grow, level down the soil in the drills. By earthing up judiciously, and giving copious supplies of liquid manure, leeks may be had of 3 lb. weight, with over 1 foot of beautifully blanched stem.

The finest leek in cultivation, both for exhibition and table, is the Holborn Model; Lyon and Musselburg are also very excellent varieties.

Manure for Leeks: Well-rotted stable manure, or, if this be not plentiful, a little dung mixed with 4 to 6 cwt. of superphosphate, 1 cwt. of sulphate of potash (or 4 cwt. of kainit), and $\frac{1}{4}$ cwt. of nitrate of soda.

Quantity of seed per acre: About 4 lb.

Leeks mature in from 100 to 120 days.

ESCHALOTS.

Eschalots may be grown throughout the year without any difficulty by dividing the roots. They should be planted in rich sandy soil, in the same way as onions. The best way is to plant them on the top of small ridges, so that the roots only will be in the ground, whilst the bulbs, being on the surface, will develop like small onions.

ARTICHOKES.

Globe Artichokes.—Two kinds of artichokes are grown by market gardeners—viz., the Globe Artichoke and the Jerusalem Artichoke. The former variety is grown in vast quantities in France, and also in some parts of Belgium and Germany, where it is much appreciated as a table vegetable. In Queensland it is rarely seen in market gardens, and seldom or never finds its way to the produce markets.

The Globe Artichoke may be raised from seed or propagated by suckers. Sow the seed in autumn or early spring (April or September), in beds of light soil, and transplant in the following autumn or spring, in rows from 3 to 4 feet between the plants, the rows being from 4 to 6 feet apart. This wide planting is necessitated by the wide-spreading habit of the plant. The soil need not be highly manured.

The Globe Artichoke occupies the ground for 180 days. In about four months after transplanting, the flower head appears in the form of a gigantic Scotch thistle. The head should be cut before it bursts into flower.

When the plant is propagated by suckers, the latter should be about 10 inches high. Plant them in rows as directed above, and shade them with pots or bushes until they have begun to grow. In October remove all small suckers and mulch the ground with dung, 3 inches thick between the rows. In the absence of dung, use grass mowings.

A bed of artichokes will last about five years, when it should be dug up and a fresh plantation made.

Early in the spring of each year dress the beds with fine wood or coal ashes. Dig this in, and then give a heavy dressing of stable manure.

Artichoke Chards.—After the fruiting season in October or November, cut away the leaves and stems of some of the plants to within 6 inches of the ground. This will have the effect of causing a number of young shoots to appear. When these have grown to a height of about 6 or 8 inches, draw the leaves together and tie them up in the same way as is done with Cos lettuce. They will be nicely blanched in a month.

Jerusalem Artichokes.—This valuable plant seems to be little known in Queensland, and still less grown and used, and yet it is a most excellent esculent for man as well as a first-class feed for domestic animals. The stems, leaves, and flowers bear a great resemblance to the well-known sunflower of the same family.

The plant is propagated by tubers instead of seed. It is not at all exacting as regards soil, and will grow in almost any situation, excepting low-lying ill-drained soils. The best crops are obtained from rich, friable, sandy loams. The cultivation is extremely simple, and does not require any extra care or skill. The land should be treated as for potatoes—that is, deeply ploughed and thoroughly pulverised. The tubers are planted 3 feet apart each way, and not too deep. No hilling up is needed. The tubers are very difficult to eradicate, consequently they should be put in some situation where they are not likely to prove troublesome.

Three or four bags of tubers will plant an acre.

The tubers will be ready for digging in from 150 to 180 days.

ASPARAGUS.

Up to a very late period it was considered that, to grow asparagus successfully, it was necessary to dig a deep pit and fill it full of manure, sowing the seed or planting the crowns on the surface. This idea has long since been exploded. To grow asparagus, no such pit is necessary. If the bed is well dug or trenched and well manured, this is all that is needed.

From the time of sowing the seed, it takes three years to bring an asparagus bed into full bearing; therefore, the best and quickest method of establishing a bed is to plant the crowns, which may be always obtained at a nurseryman's.

Trench the bed to a depth of 2 or more feet. If the subsoil be of a dense, stiff nature, break it well up with a pick, and incorporate with it yard manure, half-rotten straw, bones, &c. Replace the top soil, mixing it with old manure (horse or cow), adding a good sprinkling of coarse salt. Now leave the bed for a month or two, to allow the rain and the atmosphere to act upon it. Before planting, the ground should have another good dressing of well-rotted manure, be trenched again 2 feet to 2 feet 6 inches deep, and be again well sprinkled with salt, leaving the surface level as the work proceeds.

The best time to plant asparagus is during the months of June and July. The growing season commences in October, and extends right into March or April.

Planting: Mark out the beds 4 feet wide, with paths 2 feet wide between them. Then draw out three rows, each 15 inches from the other, and put in the crowns, 15 inches apart, carefully spreading out the roots and leaving the crowns 2 inches below the surface. Fill in the earth as quickly as possible to avoid all unnecessary exposure. After planting, mulch the rows with stable manure to a depth of 6 or 9 inches, and water liberally until the plants are established. About the last week in October (in early districts, in September) the young shoots will begin to force their way through the soil. As soon as they are 2 or 3 inches above ground, they should be cut for use, taking care to always cut well down under the surface of the ground. The cutting must be done regularly during the season of six or eight weeks, and never allow, during that time, any shoots to develop. When the season is over, allow the plants to make their natural growth, taking care not to allow any seed to ripen and drop. When the tops begin to turn yellow in the autumn, cut them down

level with the ground, and again mulch with manure, salt, or kainit, forking the surface before applying it.

A bed of asparagus, attended to as here directed, will last for seven years, and bear well during the spring and early summer. Two rows, 30 feet long, will suffice for an ordinary family.

Plants raised from seed will require four seasons before becoming productive, whilst those raised from crowns will afford a cutting in the second season—that is to say, in fifteen months.

CRESS.

The Curled Cress is the best variety to sow. Select a light rich soil; sow thickly. See that it has abundant moisture and shade. If no shady spot can be found in the garden, cover them over with boughs, so as to draw the plants and make them crisp. They will be ready to cut in from 30 to 40 days. Mustard may be sown with cress, if sown two weeks later. Both may be cut when 3 inches high.

WATERCRESS.

If your garden lies on the bank of a fresh-water creek, watercress can easily be raised from seed; or, if no such stream is available, it may be grown with very little trouble in the garden.

To raise seedlings or cuttings, take a box, bore some holes in the bottom to allow of the escape of stagnant water; set it in a shady place; put 2 inches of charcoal or other rough substance in the bottom; add 6 inches of compost, made of equal parts of well-decomposed cow dung and sand; make the surface quite smooth, and water copiously. When quite drained off, sprinkle the seed evenly over the soil, and sift a small quantity of sand over all, so as just to cover the seed. Keep the soil regularly watered with a fine-rose watering pot. Never let the surface get dry. As the plants get large enough to handle, they may be planted out 3 inches apart in a rich, well-sheltered bed, and watered regularly and abundantly until large enough to be planted out in their permanent positions. They may then be increased to any extent by cuttings, under similar treatment. After the final planting out, the salad will be fit to cut in about two months.

CUCUMBERS.

The cucumber is not very particular as to soil, so that it be light, rich, and loamy; it may be nearly all sand, provided that good rich manure be added, and that it be deeply dug. The cucumber bed should be sheltered from the westerly winds. The pits, or, as some call them, hills, should be made ready in August, in the following manner:—

Mark off the land in 6-foot squares, and at each intersection make a hole 2 feet in diameter. If the soil be not naturally rich, mix with it a compost made up of well-rotted stable manure, sheep or poultry dung, wood ashes, bonedust (if procurable), and a little salt. Fill up the hole with this prepared soil, and sow five or six seeds in it in a ring. Half an inch is deep enough for the seeds. When they are up, take out all but two plants in each hill. Stop all lateral runners as soon as they show fruit, and the secondary runners must be pinched back to the fruit in the same manner. If the weather is dry, give the beds a good soaking with diluted liquid manure about once a week. Water every evening sufficiently to damp the soil right down to the roots.

Make successive sowings during September, October, and November. To produce straight cucumbers, place under them three-sided boxes, 3 inches wide, with the open side uppermost.

A good way of watering cucumbers to ensure the water reaching the roots is, as soon as they show signs of running, to dig a hole large enough to hold a quart can, as near the roots as possible. Make holes in the bottom of the can, and place it in the holes near the roots of the plants. Put the cans in the ground, about 2 inches deep, and fill them with water every other day.

The choicest cucumber in cultivation is Lockie's Perfection. Early White Spine, Early Ridge Gladiator, and Long Prickly are also good marketing and table varieties.

Cucumbers are ready for market in from 75 to 105 days.

WEST INDIAN GHERKINS, AND THE SHORT PRICKLY CUCUMBERS.

These are used for pickling. The cultivation is the same as for other varieties. A new cucumber—the Chinese—has lately been introduced in Brisbane. The fruit is as round as an apple, and about 2 to 2½ inches in diameter. It is crisp, tender, and of delicate flavour. The vines bear heavily.

MELONS.

Melons will grow, after a fashion, on most soils, but a fairly rich, loamy soil, resting on a stiff subsoil, is about the best suited to its nature. Very fine melons, including the Rock, Water, Sugar, and Champagne varieties, are grown in quantities on our light scrub soils.

The cultivation of melons is the same as that of cucumbers. As the vines begin to run, it will be noticed that they do so with greater rapidity, and the runners look most healthy and succulent, when they make their way over some particularly rich patch or over a manure heap. The reason for this is that the rootlets emanating from the vines find their way into the rich humus, and extract nourishment, which is thus conveyed direct to the young vine. It is the same with pumpkins and cucumbers; hence, when preparing for melon-sowing, it is always well to spread a light coating of farmyard manure over the soil the vines will probably cover. When sowing, the seed should not be covered with more than an inch of soil. In dry weather, plentiful watering must be given to the vines, but no stagnant water must lie about the roots, or the plants will not thrive.

Sow in August and September, and, for succession, up to and including October. The fruit matures in from 100 to 180 days.

To ascertain when a melon is ripe, tap it with the knuckles, and, if a hollow drum-like sound is heard, the melon is ripe. This only refers to water melons.

Good varieties are—Black Spanish, Ice Cream, Mammoth Champion. Amongst the best rock melons are—Skillman's Netted, Yellow Cantaloupe, Hackensack, Emerald Gem, and Large Persian.

Pie melons, for making jam and as a substitute for apples, are cultivated in the same manner as the above.

PUMPKINS, SQUASHES, AND VEGETABLE MARROWS.

These are all cultivated in the same manner and sown at the same season of the year as melons and cucumbers. The only difference is that they require much more space, owing to their more vigorous growth. The holes should be 8 feet apart, instead of 6 feet, and only one plant of pumpkins in each. In the case of custard marrows, two plants may be left. Pumpkins come to maturity in from 130 to 150 days; vegetable marrows in from 75 to 105 days.

EGG PLANT.

This excellent vegetable, called indifferently Egg Fruit, Bringal, and Aubergine, is another of those vegetables which are rarely grown in Queensland. It is as hardy and as easy to grow as the tomato, to which it is allied, both belonging to the order *Solanum*.

The purple variety is the kind most usually grown for the table. The fruit should be picked before it loses its brilliant hue.

Sow the seed in September, in a warm spot, and thin out when large enough to 2 feet apart. The plants removed may be planted out elsewhere.

The best varieties are—New York Purple, Long Purple, Black Pekin.

The nicest way to cook the egg fruit is to boil it for twenty minutes, then to slice and fry it, adding pepper and salt.

TOMATOES.

The tomato being a gross feeder, the soil in which to grow it can hardly be too rich, especially in lime, potash, and phosphoric acid. A perfect tomato-soil is a rich sandy loam, well drained, deeply ploughed, and subsoiled. Sow the seed in August and September, and, when the plants are about 6 inches high, thin them out to about 3 feet apart, and put up a light trellis to train them on. The plants which have been taken out may be planted in some other part of the garden. Before planting out, clip all the leaves off except the top bud. The plants so treated will start to grow immediately, because they are not obliged to expend their energy in trying to revive the dying leaves. The plants will bear a month earlier.

When the first fruit forms, stop the plant by pinching off the ends of the shoots.

A very good plan to train tomatoes is to erect a framework of hardwood pegs, 18 inches above the ground, nail hardwood battens on the top, and stretch wire netting across it. The young vines must be properly guided and trained through the meshes, and not be allowed to fall back again. When the vines are full grown, the top of the netting is a complete mass of fruit and leaves, and all the fruit is clean.

Tomatoes may also be trained on stakes. As soon as the planting is completed, a split stake, 5 feet in length, is firmly set at each plant, and about the time the fruit is setting each plant is tied with common cord. The string is tied firmly round the stake, and loosely about the stem of the plant, so as not to interfere with its growth. Care must also be taken not to allow the fruit to cluster, so as to rub against the stake.

The sprouts or auxiliaries will grow very rapidly, and must be constantly pinched off. Three tyings are usually necessary up to the time when five good clusters of fruit have set. When these aggregate 20 or 25 tomatoes, the top is pinched off, and the whole strength of the plants is centred in the production of firm, bright, smooth tomatoes, of good and uniform size. Pinching back the suckers tends to increase the size of the leaves, making shade for the fruit. Constant systematic pruning forces the plant into fruiting; therefore, carefully remove all suckers.

Tomatoes mature in three or four months, according to the soil, season, and climate.

Manure for Tomatoes: It is a prevalent idea that the tomato will not stand heavy manuring. This is only true of the crop after the fruit has set. In the early stages of development, nitrogen, phosphoric acid, and potash may be liberally supplied with advantage, but, after the fruit has set, manuring with farmyard manure or other stimulating fertilisers delays the development and ripening of the fruit.

A good manure is made up as follows:—

2 parts of nitrate of soda;

2 parts of bonemeal;

3 parts of kainit;

4 parts of superphosphate.

Of this mixture, 1 oz. per square yard of soil may be applied weekly, from the time that the plants are established till the fruit has set. Superphosphate has been found to hasten the maturing of the fruit.

SEA KALE.

The cultivation of sea kale is much the same as for rhubarb, as will be described later on. The ground must be deeply trenched and heavily manured. As a dressing for autumn, a sprinkling of salt is very desirable. Obtain strong two-year-old roots, and plant three together, 3 feet apart in the beds. Early in the second season of their growth they should be covered over with earthenware pots or boxes. If pots are used, cork up the hole in the bottom, and draw soil round to keep out all light. This will cause them to blanch,

as it is only in this state that they are used. When the plants are 8 or 10 inches high, they may be cut for the table. As soon as the full cutting has been made, clear away the covering to allow the plants to make their natural growth and recover themselves for another season.

Sow seeds, or plant roots, in August and September.

SPINACH.

Of the two varieties of spinach (the round and the prickly) grown for market, the prickly is the more hardy. For this reason, the latter is generally sown for the winter crop, and the round for summer crops.

The ground for spinach must be worked deep, and, as quick growth is necessary, the soil cannot be too rich. Sow the seeds in rows about 1 foot apart (some prefer the rows 2 feet apart). When the young plants have made four or six leaves, thin them out to from 9 to 12 inches apart. While growing, plenty of water is required to bring the crop to perfection, and the ground must be kept free from weeds.

Sow the prickly from March to May, and the round in August and September. Guano, lime, and salt are excellent for this crop.

The leaves will be ready for cutting in from 80 to 100 days from sowing.

RHUBARB.

Rhubarb may be grown on almost any well-drained soil, but a rich deep loam yields the best product. The soil must be both rich and deep, and the deeper it is the quicker will be the growth. The bed ought to be trenched to a depth of 2 feet, and very heavily manured with good stable manure mixed with cowyard manure.

To grow the plants from seed, a well-manured seed bed should be prepared, and the seed sown in August or September, in drills about 1 foot apart. The young plants will require plenty of water in dry weather, and a light shade will also be beneficial to their growth. Thin out the plants to about 6 inches apart, and let them remain in the seed bed until the following spring, when they can be transferred to the permanent stand. The rows should not be less than 4 feet apart, and the plants at least 3 feet apart in the rows. During the first year the space between the rows may be utilised for growing lettuce or any other low-growing vegetables, but after that the plants will require the whole of the room for their full development. The ground should be kept well cultivated and free from weeds, and all flower stalks should be cut off as soon as they appear, in order that the plants may not exhaust themselves by forming seed.

In the winter of each year a heavy top dressing of coarse manure should be applied, and this must be carefully forked in in the spring, care being taken that the roots are not broken or disturbed in any way. No stalks should be used until the second year, and if left until the third the plants will be all the better. No plant responds more liberally to judicious watering than rhubarb, and in dry weather irrigation gives surprising results in the way of increased yield and general vigour of the plants. Water should be vigorously used when necessary, but at the same time it is well not to over-do it, and thus make the ground sodden. Liquid manure, applied occasionally, is also of great benefit.

Instead of raising the plants from seed, which is a rather slow process, it is often more convenient to plant "crowns"—that is, roots—one or, preferably, two years old. These, planted in the same manner as the seedlings, when set out in permanent beds, come on very quickly. Such crowns, if planted in July or August, begin to grow at once, and in September the stalks from them are ready for use.

By purchasing crowns, therefore, you can have rhubarb fit to use in two months instead of having to wait for two years for seedlings to come to maturity. It will be found more profitable to purchase strong sturdy crowns, and renew them every third year, than to go to the trouble of raising seedlings, which will probably not be very strong or vigorous.

AFRICAN WONDER GRASS (*PANICUM SPECTABILE*).

We have received from Mr. B. Harrison, Burrington, Tweed River, New South Wales, the following account of a new fodder grass, which was originally introduced into Western Australia, and which has apparently worked its way into favour at the Experimental Farm at Bathurst, New South Wales. The writer says that it is too coarse for hay. That seems to us to be a disadvantage. When the Johnson grass was introduced into this State, it was lauded to the skies as a wonderful fodder grass, and no doubt it is an excellent grass for stock when young and succulent; but it had two faults at least. One was, that it was too coarse for hay; the other, that once it was sown in a field it speedily took possession of the land, and not only became exceedingly difficult to eradicate, but rapidly spread to the neighbouring lucerne fields, where it was not long before it overpowered the more valuable crop. In all cases of new grasses we would advise caution, and an application to the Colonial Botanist, Mr. F. M. Bailey, for his opinion on its habits. In this State we have had bitter experience of the introduction of new plants of reputed great economic value, which have been afterwards proved to have been rather a curse than a blessing.

Mr. Harrison says of this grass:—

This is the heaviest yielding grass in Australia, and it has also proved one of the best drought-resisting species. To those who own poor soil or live in the dry districts, it should prove a great boon. It is readily propagated from roots or portions of the procumbent stem, which roots freely at the joints. When well established, it forms a mass of the richest green foliage, about 5 or 6 feet high, gradually lowering to the outer border, where a network of shoots and runners cover the ground; it roots at the joints, and sends up then a mass of the softest and most luscious fodder. It is one of the best pasture grasses we have in Australia, and it should also make good ensilage, but is rather too coarse for hay. It is spoken of in the highest terms of praise by all those who have grown it, on account of its rapid and luxuriant growth. A writer in the "W. A. Journal of Agriculture" says:—"As a result of numerous experiments, the African Wonder grass has proved the best of all the grasses yet introduced to the State; it has succeeded in almost every place where it has been tried, both in dry and moist situations, and the introduction of this grass for the stock-breeders of this State is worth several times over all the money that has been spent for grass seeds and experimenting with grasses during the last few years." At the Bathurst (N.S.W.) Experimental Farm "this grass has proved a vigorous grower, is unaffected by frosts, and sheep like it well." This grass has been grown at several of the W.A. experimental farms, and "has given most promising results; in fact, it seems to stand the dry weather better than any grass we have yet had growing. From reports received it appears to be doing equally well in sandy and clayey land, and also in dry places." This grass grows most luxuriantly, and, as well as the upright growth, it sends out long lateral stems, which form fresh roots at the joints or nodules, and cause the grass to spread quickly.

THE PRICE OF WOOL.

The question of the price of wool not only affects the owners of large flocks, but even, in a greater degree, the grazing farmer, who, on his 20,000-acre grazing selection, is vitally interested in all that concerns the prices of sheep products. It will be pleasant reading for the latter to see what the special Bradford correspondent of "Dalgety's Review" has to say on the high values of wool to-day, as compared with the prices obtained for good wool in 1895. He writes (10th December):—

A great number of consumers of wool in this district cannot for their life understand why wool values should keep on the high level which they are, for

never before has a 2,000,000-bale clip been exported from Australasia at prices anything like where they are to-day. In 1895 we had good wool then at 6d. per lb., whereas to-day the same article is worth 1s. 1d. to 1s. 2d. per lb., and many think that rates to-day are fictitious and unsound. I venture to say that prices are now really resting on a firmer basis than they were in the cheap days of the early nineties. Those were the days of surpluses and when stocks were high, whereas to-day users are on the sheep's back clamouring for its fleece. All along I have strongly maintained that the majority have, during the past twelve months, over-estimated production and under-valued the extent of the world's needs. Some of the best men in the trade, from their constant repetition of the story that wool prices are "dangerous," seem to have totally lost sight of the fact that all along production has not overstepped consumption, and that to-day, with a bigger world's needs than ever, there is not much chance of any substantial ease. Everything, I say, is being determined by big wants that remain still unsatisfied, and if these financial and industrial crises come they will not diminish one iota the requirements of the world. No doubt we shall see a temporary set-back in prices, but, as for altering or minimising the call for wool, that I fail to see. It is high time of the day that pessimists recognised that consumption has all along kept at a quicker pace than production, and that the clip of wool at present being grown no more than satisfies the call for wool-made fabrics.

OBJECT OF APPLYING ARTIFICIAL FERTILISERS.

When a farmer applies a fertiliser to the soil, what does he do it for? He is simply supplying so many pounds of food to his plants, just as he gives rations of fodder to his live stock.

The crop, as it grows, consumes or assimilates, besides other substances, a certain quantity of nitrogen, phosphate of lime, and potash; and when we put on the soil dressings of nitrate of soda, superphosphate, kainit, or other fertilisers, we are providing the crop with a stock of food for the period of its growth.

Thus, a dressing of $1\frac{1}{2}$ cwt. nitrate of soda to the acre furnishes 26 lb. of nitrogen, equivalent to 31 lb. of ammonia; 3 cwt. of superphosphate furnishes 87 lb. of soluble phosphate of lime; 2 cwt. of kainit furnishes 29 lb. of potash.

The following table gives the weight in pounds supplied by 1 cwt. of the principal commercial fertilisers, and will be found useful for reference:—

- 1 cwt. of sulphate of ammonia contains 27.44 lb. of ammonia, equal to 22.60 lb. of nitrogen.
- 1 cwt. nitrate of soda contains 17.36 lb. of nitrogen, equal to 21 lb. of ammonia.
- 1 cwt. kainit contains 14.56 lb. of potash.
- 1 cwt. sulphate of potash (90 per cent.) contains 55 lb. of potash.
- 1 cwt. muriate of potash (80 per cent.) contains 56 lb. of potash.
- 1 cwt. superphosphate (26 per cent.) contains 29.12 lb. of soluble phosphate of lime, equal to 13.27 lb. of soluble phosphoric acid.
- 1 cwt. superphosphate (36 per cent.) contains 40.32 lb. of soluble phosphate of lime, equal to 18.46 lb. of soluble phosphoric acid.
- 1 cwt. basic slag (26 per cent.) contains 29.12 lb. of phosphate of lime, equal to 13.27 lb. of phosphoric acid.
- 1 cwt. basic slag (38 per cent.) contains 42.56 lb. of phosphate of lime, equal to 20 lb. of phosphoric acid.
- 10 tons farmyard manure, 120 lb. of nitrogen, 115 lb. of potash, 60 lb. of phosphoric acid, chiefly slowly available.—"Mark Lane Express."

Dairying.

DAIRYING INDUSTRY.

COMPREHENSIVE REPORT.

By G. SUTHERLAND THOMSON, Government Dairy Expert.

The passing of the Dairy Produce Acts marked an epoch in the history of agricultural progress, for probably no branch of agronomy in the States of Australia has shown such rapid growth as the dairying industry of Queensland. To review the changes that have taken place in all departments of dairying of recent years would make reading of great interest, and I may be pardoned for giving a brief *résumé* of the improvements effected since I came to the State four years ago. At that period the industry was struggling for a position amongst the Australian States in the manufacture of butter, and, although an export trade was opened up with Great Britain, very feeble headway had been made, for there was no recognised system in the manufacture and classification of produce. It was at once visible to me that Queensland had made a very bad beginning, and the first step towards success was to reorganise the industry on entirely new lines. This necessitated the preparation for the passing of a Dairy Act, which in itself was a heavy task for one person to undertake, but there was no alternative, and my efforts were directed to touring the State and lecturing on the value of such a measure. In all, I delivered over sixty addresses, and it was then I fully recognised what splendid prospects there were in Queensland for the dairy farmer; at the same time, it was evident that the injurious effects of the early teaching of dairying would be a strong barrier against lifting the industry into prominence in the export of dairy produce. At that period there was no such thing as a system of cream grading; everyone had his own ideas of the science and practice of dairying, and did as he thought fit. The classification of butter was little more than talked of, although the Department possessed a set of stamps, which I found it necessary to lock up, as a means of protection against the abuses of the practice of grading then in vogue. There was no grading inspector in the service, and the industry appeared to be drifting any way. Still, it is maintained at the present time amongst some people, that the quality of butter and cheese in those days was superior to what it is now. I can only say that my investigations then revealed a bad state of affairs, for brands of export butter were made up of all grades, and this was borne out by the miserable prices the produce brought in England, and the very poor reputation the State had in the manufacture of an export product of a reliable quality. The question of refrigeration was claiming some attention by shippers, but it was the custom to rail butter at high temperatures in summer, and to put it on board steamer in the same melted condition as it arrived in Brisbane. Milk and cream testing was done in most cases by inexperienced hands, and the knowledge necessary to obtain correct results was not viewed with much concern by factories. But, at the same time, big profits were made, for it was the heyday of the manufacturer, who had as his slave the struggling producer. At last the tide has turned in his favour, and the dairyman's interests are the interests of the State, for assistance is given him to turn the labours of the farm to the best account, and he is protected against the wrongs which were so common in the past.

Now, let the reader follow me along the main channels of progress during the past four years, and see what has been accomplished to raise the status of dairying, and place it on a more uniform basis of profit for the producer and manufacturer.

An Act of Parliament was passed, and, although the measure was robbed of an important clause to make the grading of cream compulsory, it has established the industry on a good footing.

There have been reforms in the handling, collecting, and storing of cream at the farm, dépôt, railway station, and factory.

Dairy inspection has proved valuable in improving the source of the milk and cream supply.

Refrigeration at factories, cool cars on the railways, cold storage of produce in Brisbane, and the shipment of butter at low temperatures to oversea markets have returned profits to the farmers. Scientific investigations into taints and defects in produce, and the publication of literature on this and other subjects of practical worth, have added to the success of the industry.

Aids to improvement in milking stock and other departments of practical dairying are noticeable features in the advance of the industry.

Modern methods of testing milk and cream for butter fat, and the thorough investigation of the weaknesses which surrounded the practice, may be reviewed with special favour by every dairyman in Queensland. What now remains to be done to place this important branch of dairying on a satisfactory basis is, to end the bitter competition for the farmers' supplies.

The standardising of all glassware used for testing milk and cream and the inspection of same are progressive steps in the interests of the producer.

The value of science to dairying has not been lost sight of in Queensland, and through its introduction into all branches of the industry, much has been saved to the individual and to the State.

In consideration of all these reforms in dairying, the reader must remember that each had to be fought for, which, in most instances, entailed considerable labour.

I shall now deal with the official report of my inquiries in Britain into agricultural matters, chiefly dairying, in which the grading of butter will be dealt with in full.

INTRODUCTION.

During my term of inspection of Queensland dairy exports in Great Britain, I had the fullest opportunity of ascertaining the chief defects in the quality of the produce, and to what causes the low prices of Queensland butter and cheese were attributed to. My knowledge of the industry in Queensland, and the particular attention I previously had given to grading, enabled me to more readily recognise hurtful conditions in the shipment of butter, and to identify the same with the methods of production commonly adopted throughout the State; and, to succeed in this direction, no better facilities could be offered than the British markets, for there, all evils militating against the selling value of butter and cheese are laid bare.

Not being deputed by the Queensland Government to give attention to the butter trade in London, I left the State on my own initiative, one of my reasons being to confirm the existence of evils which I felt certain were impeding the progress of the industry, and to better my knowledge in branches of dairy science and practice, which otherwise could not be obtained in Australia. Subsequent, however, to my arrival in England, I had the honour of executing, at the instance of the Government, an investigation into the quality of Queensland dairy produce on the London market, and I hope that the knowledge gained of the requirements of the trade and of existing errors in butter and cheese production in this State will be of some benefit to the dairy farmer and manufacturer.

While in London I was struck with the high tribute all sections of the produce trade paid to the dairy legislation of Queensland, and it required

no effort to show that the Queensland Dairy Act had saved the dairyman and the industry from a bad future.

In conclusion, I have much pleasure in thanking the produce firms of London for the splendid assistance they gave me to make the object of my mission a success; also, I feel most grateful to the Agent-General, Sir Horace Tozer, and his staff for the unremitting attention and kindness shown in all that pertained to my inquiries in Great Britain.

DEPARTMENT OF AGRICULTURE AND THE PRODUCER.

The Department of Agriculture has a high duty to perform in guiding the producer to success by protecting him from the possibilities of danger which may impede his progress and discredit the future operations of the farm. To the Department as a reliable source he should look for a solution of the many difficulties which may confront him in the science and practice of his calling. Doubtless the farmer is aware that no branch of agriculture and, perhaps, no industry harbours greater opportunities, and is prone to more weaknesses in the capacity of men to discharge their duties without freedom from error, than that which concerns the manufacture, export, and distribution of butter. It is, therefore, to the best interest of the producer that his connection with the industry should not end in the cheque he receives for his cream, but he should satisfy himself that all precautions are taken to justify him as an earnest supporter of the factory which he is associated with. In vital departments of dairying the farmer's advice is not sought after, and he must, therefore, abide by the decision of his advisers, who are entrusted with the gravest responsibilities in building up a reputation for the deserving farmer, and on which the prosperity and permanency of the industry depend. Let the best judges of the quality of the butter guide him as to the progress of factories, and these are the merchants, grocers, and consumers in oversea countries, who enjoy the unrestricted privileges and freedom to choose the produce of every nation exporting—produce manufactured by skilled men and graded by Government officers, who instruct the producing centres to enforce the utmost care and honesty in all that pertains to the elevation of the industry; and were the producer to stand on the floor of the warehouse of the British importer and see the world's butter and cheese laid bare to be scrutinised by the most alert and proficient of authorities in Britain, he would learn of the lessons which the errors of the industry are costing him. Of the examinations of butter which take place in these warehouses every hour of the day, he would quickly recognise that the proud rivals of Australia for the honours of the British market—Denmark and New Zealand—stand far ahead of any other country in the genuineness of their brands; and in this the buyer, whether wholesale or retail, has infinite faith, because his experience—which is wide and varied—and his customers—who are numerous—tell him so. Let the farmer here ponder, and the veil may be removed from his eyes to show him the light to greater success and higher profits for the labours of the farm. And he should not lose sight of the fact that it is not essentially the proportion of high-class butter that builds up a great name for a country: it is the honesty of the grade, whether first, second, or third, that wins the confidence and patronage of the British; and in this, Queensland has been at fault. And what is responsible for this might be queried. Doubtless the bitter struggle amongst factories for the supremacy of the industry is leaving a dark mark in its trail, and the producer must soon decide what action he should take to gain a firmer hold of the reins to guide the industry to a higher and more successful plane. Of recent months much has been said against the efforts of the Department to put dairying on lines of promise, but perhaps the restrictions of knowledge of the subjects embodied in discussions may be taken to ameliorate the attitude of those in opposition to the Department, and the producer, after due consideration, should have no great difficulty in determining the right from the wrong.

A TOOLEY-STREET SHOW ROOM.

It is natural that those interested in the dairying industry, and particularly the farming community, would wish to know what features are specially noticeable to the visitor when he views the butter floor of a Tooley-street importer. There he can see the chilled produce arrive by the barges which carry it down the Thames direct from the freezing chambers of Australian liners. Everywhere is bustle when the bulky river boats are unloading, and everything can be noted, from the discharging of the slings laden with boxes until the butter is opened up in the merchant's warehouse, examined, sold, and despatched to some provincial town or country village. The doors of the produce firms are open to inquirers; you enter, and see brands of butter from all factories drawn up in lines and ready to be sampled. There one can observe the merchant who has come from some inland town to purchase his requirements, and see him debate the quality with the seller and close the bargain. Again, you may recognise the agent (whose duty it is to buy for a hundred or more shops) carefully test brands of suspicious character, and finally decide to take a proportion of first, second, and third grades, until his orders are filled. These men can tell you of the progress of every country exporting butter, the faults of any brand, and what is required of the factory to improve the output and give the trade greater faith in the produce. But to obtain your information from these buyers is not necessary, for you can personally examine the butter and satisfy yourself of its defects, follow the produce to the shop of the small merchant and country grocer, and hear what they have to say in its favour or against it. This course I carried out in its entirety when in England, and, together with the views given by merchants of all standing, I obtained a good knowledge of the trade and what is required of the State to improve the farmer's position in British markets.

WHAT A BRAND OF BUTTER MEANS.

A brand of butter carries with it the reputation of the factory from whence it came, and it is in London that this very forcibly appeals to one. Standing around a heap of boxes, each with its lid off, the visitor sees butter-graders testing the quality and honesty of brands, for upon these conditions its popularity and prices depend. If all is satisfactory, the brand adds to its good name, and, if this is repeated regularly, the factory producing the butter and the State or country exporting it win the confidence of merchants and their patrons, and thus the foundation of a successful and profitable career is established. But, on the other hand, if the butter is not up to the standard of the factory's choicest brand (which is portrayed with the name of the factory on the boxes), is mixed in quality, and under weight, the reputation of the factory is seriously endangered; and, should this occur several times, merchants will not treat the produce with that confidence which is essential to the success of the factory. And how far does this bad news travel might be queried by the farmer whose future depends on the factory? It is passed from merchant to merchant; and my experience in England has shown me that the finding of such serious defects is frequently made in the shop of the country grocer, with disastrous results to the factory and injury to the State. Several times I have seen the produce of our factories (choicest brands) returned to London, not being up to the standard or guarantee of the factory; and the producer may judge the reasons why Queensland butter does not realise a price in accordance with the best efforts of the intelligent and progressive dairy farmer.

GOVERNMENT STAMP.

And had the visitor to London followed the brands of butter bearing the Government stamp from the barges to the warehouses, he would have probably read a simple lesson of the value of official inspection. But it does not begin or end here. Careful examination conducted by me in London proved

the value of the stamp in describing the quality of the produce, and in this the importer finds safety in his sales, likewise does the grocer, and in turn the consumer is protected. Just imagine for a moment what desultory results would follow if the dairy produce of Queensland, when not true to the factory brand, is put on the market without an official mark to denote the grade. Without the protection which the mark affords, it would not take long to drag the industry back to the miserable place it held five years ago. And here I might again remind the producer that it is fallacy to think that the Government stamp acts as a lever to the buyer to attain greater profits; it is not so, for the manufacturer is virtually compelled to pay a higher figure for produce when it can always be depended upon, and to stamp the butter is to show that the State is acting in the best interests of the farmer, factory, and trade.

For a convincing answer to this I refer the reader to the high and steady prices of New Zealand butter, every box of which is stamped with the grade; and, had the producer accompanied me in my travels in Great Britain, ample scope would have been given him to determine the means of the Dominion's success.

Queensland is gaining that confidence which has made the dairying industry of New Zealand famous, and the dairy farmer has to thank grading for the good it has done in this direction. The anti-grader scorns the marking of boxes with the grade distinctions. He asks for a certificate number to be placed on the boxes instead, which is worthless as a guide to the buyer we at present chiefly depend on—namely, the small merchant and grocer of Great Britain. To revert to this system is to open the door to practise the greatest evils of the industry—gambling and bartering in the sales of the produce; and it is to be hoped that the solicitations of the anti-grader will be carefully considered before an answer is given to his demands.

VALUE OF BUTTER GRADING.

Grading has, without question, done more to uplift the market value of butter than any branch of educational work introduced on behalf of the industry. The institution of the system of grading in Queensland was a big undertaking, and before its beneficial effects were illustrated radical changes had to be made in the manufacture and classing of butter into its respective qualities. The graders had, therefore, a heavy task to perform, and, although they could not, at the outset, stem every abuse current, their good work soon became evident in London and elsewhere. The great worth of compulsory grading to Queensland dairying may be summarised as follows:—

- A. It was invaluable in showing what position the industry occupied in the export of produce of good quality.
- B. Errors and carelessness in the handling and treatment of milk and cream have been traced through the agencies of grading.
- C. Grading has determined the extent of every costly defect in the manufacture of export produce, and has been indispensable to scientific investigations of taints in produce.
- D. Evil practices in the classing of cream, manufacture of butter, and incompetency of factory employees to do justice to their work have all been demonstrated by the official inspector of exports.
- E. Grading has proved a key to abuses in the purchase of cream, and through its influence valuable reforms have been effected.
- F. The carrying properties of butter have been investigated through the introduction of grading, and it claims much towards improvements in the cool storage of butter and cheese.
- G. Grading has protected the buyer against the wrongdoings of the export trade, and the confidence of the world's merchants in the honesty of brands has been more firmly established since grading was made compulsory in Queensland.

- H. It may also be claimed for grading, the better distribution of butter in oversea markets; and it is safe to assert that higher prices have been obtained for exports through the good effects of inspection.
- I. One grand object of grading is to establish honesty in all transactions with butter, as the grade stamp on the box is the hall mark to the quality of its contents.
- J. Grading may well be termed the farmer's friend and adviser, and no person should have welcomed the practice more than he.
- K. Grading has raised the status of dairying, and it has been a pillar of education to the industry.

PRECAUTIONS TAKEN IN GRADING.

The true value of classing butter is based on the ability of the grader to determine its keeping properties, and to stamp the produce with the grade indicative of the quality of the butter when opened up in the warehouse of the London merchant. For example, if the flavour showed a trace of stale cream, the grader would be seriously at fault if he stamped the butter first class, as a product of this quality would quickly deteriorate after removal from cool storage. But to the average person this grade of butter would appear satisfactory, or it might be considered superfine. Again, a brand of butter might be absolutely free from any foreign flavour, and possess an agreeable taste, yet the carrying properties would not ensure a first-class stamp, as would be shown by the very inferior character of the texture. It is, therefore, evident that the grader's faculties must carry him further than the quality of the butter at the time of grading before he feels justified in affixing the official stamp. He must give careful consideration to all conditions which precede bad flavours, and also consider the age of the produce at the time of grading, the temperature at which it is to be stored previous to shipment, and the period of storage.

I have all along exercised this precaution in advising in the grading of Australian butter, as past experience has clearly demonstrated the dangers of classing produce entirely on the basis of its quality previous to shipment. It would be quite a different matter if our produce were manufactured for immediate consumption, but when it has to be exported a distance of 13,000 miles the above precautions are amply justified. It is the consumer in Great Britain who is the judge and the critic of Queensland butter, and it is he whom the manufacturer and the exporter have to please, and the efforts of the Department of Agriculture are made with a view to win the confidence and appreciation of the buyers and consumers at home and abroad.

MARKING BOXES.

This is a very sore point with some members of the industry, and a strong effort has been made to have the grade mark on the boxes abolished, for reasons which will be fully dealt with later on. From my observations here and in Great Britain, I fail to see that the principle upon which marking is based should be objected to by progressive dairymen and butter manufacturers, and what advantage the industry is to enjoy were the grade distinctions to be kept off the boxes. Experience has conclusively proved to me (as it has to others who have had similar opportunities to test the practice) that in ninety-five cases out of one hundred test boxes of Queensland butter graded first, second, or third have arrived in London in that class. Objections to marking the boxes may be expected from some factories where the classification of cream is scouted and brands of butter are made up of different grades; and I have good reason to point to this iniquitous management of the business of producers as one of the chief

causes for complaint. Stamping the boxes with the Commonwealth mark of quality, as the reader will quickly recognise, is a fitting reward for this condition of affairs, and, had the Government of Queensland lent its sympathy to the anti-grader in this direction, the dairy farmer of Queensland would not have been in so favourable a position as he occupies to-day. The protection marking gives to the dairying of the State is more thoroughly understood from the standpoint of the Queenslander who is fortunate enough to inspect the State's produce in oversea markets, and to follow it to the floor of the intermediate buyers and to the counter of the country grocer. Here I may narrate one instance which gives support to my contention.

While engaged in finding markets for the State's produce in Scotland and making inquiries into the demands of the trade, I traced a box of Queensland butter to the shop of a retail grocer in a fashionable town in the upper reaches of the Clyde. The box bore the official stamp of the State Government, and was classed No. 1. It also showed the grader's mark "Tested," which is a distinguishing mark put on every box sampled by the official inspector in Brisbane. Upon examination of the butter in the grocer's shop, I observed the mark of the grader's trier, and, after testing the quality of the produce, it was found true to the grade. The grocer did not hesitate to show his appreciation of the system of marking boxes, for reasons which I feel sure will find favour with every producer in Queensland. He explained, in terms similar to many others, that the country grocer had not found it convenient and profitable to go to the city to inspect his purchases of dairy produce, and, as butter went through a good many hands, there was the chance of getting an inferior product for which a high price might be quoted. With the Government grade distinction on the boxes he would only require to state in his order that it was butter marked first class, second, or third class he required, and on these boxes from Queensland the grocer would find the churning number and the date of manufacture of the butter, which would prove the age of the product, and be of great value in other ways.

"TESTED."

In attacking the grade mark, no mention has yet been made to me that there is evidence that inferior butter improves *en route* to London, as shown by the examination of boxes of butter marked "Tested," which mark, as already stated, is put on every box the inspector examines when classing the grades. This step was taken by me to afford the trade in London an opportunity to determine who was responsible for any error which might be found in the classification of the butter by the factory or Department of Agriculture. The Department knows by the brands on the boxes who graded the butter, and when the necessary information is given of a faulty parcel inquiries are made through the proper channels to locate the mistake.

REGRADING.

Because butter is sometimes regraded previous to shipment, this is taken as an argument in favour of butter changing in flavour in cool storage to an extent that the grade marks become a menace to the disposal of the produce. In answering this contention, I may point out to readers that regrading is only done at the port of shipment when butter is of a quality that is termed a very poor first or second, as the case may be, and this applies to produce that has not been shipped at a period stated in the shipper's certificate, but has been returned to the cool store or retained there for export by another steamer—perhaps a tramp—sailing a fortnight hence to London by the South African route.

Regrading is not paying a compliment to the produce and the refrigeration of the chamber in which it is stored, for seldom is it found necessary to restamp

butter that has been kept at the proper temperature when delayed for shipment, and under the conditions necessary to prevent fermentation injuring its carrying properties.

WHY OBJECT TO GRADING?

When perusing these pages, the producer will probably ask himself the question,—Why resent the official inspection and classification of butter, when it has been conclusively proved in open competition that it has benefited the industry? But the dairy farmer will also learn in these pages of the existence of a strong desire on the part of the anti-grader to return to those years when everything was profit, and the manufacturer was master of the situation. One danger of grading lies in assisting the exporter to increase his profits, for a first-class butter might, through exposure to hurtful conditions after grading, change into a second-rate product; but a low-grade article will not cast off its stale and rancid flavour in the cool stores of oversea steamers, and afterwards grace the window of the British merchant, faultless in flavour. Herein may lie the crux to the position, for it is this sort of stuff that the exporter wishes to be left religiously alone; he fears not the choicest brands, and would willingly consent to every box being stamped with the Commonwealth mark of quality. Fortunately, I have had experience of this kind of butter and its attendant evils, and it is perhaps as well that the public are not conversant with the injustices which surround the butter business, although the Royal Butter Commission of Victoria did yeoman service to Australia in this investigation, for which we ought to be grateful. Speaking plainly, the object of recent agitations against butter grading is a breach of the spirit of the Dairy Act; and, with a knowledge of the past history of the butter industry in Australia to guide one, and which alone justified the introduction of the measure, any movement calculated to weaken or nullify any of the provisions of the Act would be nothing short of a calamity. One grand feature of the Act is to promote honesty in our commercial transactions, and confidence between buyer and seller. Concessions such as those requested by deputationists would lead to requests for still further concessions, and every point gained would be a step nearer those halcyon days when all butter, no matter how bad the quality, was described as “choicest this” or “primest that,” in boxes containing from $\frac{1}{2}$ -lb. to 3 or 4 lb. less than the net weight stated on the brand. An old friend, “nominal weight,” and similar devices to mislead buyers, which did such splendid service in the past, would once more appear on the commercial horizon. To my mind, the anti-grader has done estimable good for the cause of Queensland grading; in the first place, by falling helplessly into the traps he had laid for others; secondly, by the lack of knowledge he displays in all sections of the subject which concern the benefits the producer enjoys from the strict inspection of exports; and, lastly, by a vigorous protection of the demands of that type of keen and astute exporter whose whole ambition is wrapped up in the motto “Accumulated wealth.” Let the cream supplier rest assured that his interests are being protected against the wrongdoings of the export trade, and I am determined that no stone shall be left unturned to win for his produce a reputation worthy of the industry and the State. My labours have been given particularly for his benefit, and I have no reason to be dissatisfied with the results achieved during the past four years.

INJUSTICE TO THE STATE.

The anti-grader has not been content to damage the efforts of the State to help the dairyman to make a success of his calling, but in his desire to crush grading has discredited the possibilities of Queensland to manufacture butter of a quality that would pass the rigid inspection of the Department of Agriculture to attain the coveted superfine grade mark. In the production of butter of this standard the factories have been successful, and thus the reputation of the industry has been deservedly advanced.

CO-OPERATION A REMEDY.

The co-operation of milk and cream suppliers to further the interests of the industry should be firmly established. When this is accomplished, and in the hands of strong leaders—men capable to guide the producer on the lines of true progress—many of the obstacles at present retarding the advance of dairying will be abolished.

[TO BE CONTINUED.]

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE,
GATTON.

RETURNS FROM 1ST TO 31ST DECEMBER, 1907.

Name of Cow.	Breed.	Date of Calving.	Yield of Milk.	Babcock Test, Per cent. Butter Fat.	Commercial Butter.	Remarks.
			Lb.		Lb.	
Whitefoot ...	Holstein-Sh'rth'rn	28 Sept., 1907	920	4·0	41·21	
Cocoa ...	Jersey ...	..	872	4·2	41·01	
No. 1 ...	Shorthorn ...	26 Nov. ..	947	3·4	36·06	
Reamie ...	Holstein-Sh'rth'rn	Oct. ..	879	3·7	36·82	
Gurney ...	Grade-Ayrshire	..	839	3·8	35·70	
Mona ...	Holstein-Sh-rth'rn	Oct. ..	834	3·8	35·47	
Careless ...	Jersey ...	20 Oct. ..	772	4·1	35·40	
Dripping ...	Holstein-Sh'rth'rn	28 Nov. ..	750	3·9	32·76	
Haze ...	Ayrshire ...	..	794	3·7	32·90	
College Lass	Ayrshire ...	14 Sept. ..	795	3·6	32·05	
Dora ...	Shorthorn ...	9 Sept. ..	768	3·7	31·82	
Laura ...	Ayrshire ...	25 May ..	765	3·7	31·70	
Pee-wee ...	Holstein-Sh'rth'rn	6 April ..	719	3·7	29·79	
Butter ...	Shorthorn ...	22 Aug. ..	676	3·9	29·52	
No. 112 ...	Grade-Jersey ...	..	691	3·7	28·63	
Gem ...	Shorthorn ...	28 Aug. ..	704	3·6	28·38	
Princess ...	Shorthorn ...	..	630	4·0	28·22	
Primrose ...	Ayrshire-Guernsey	May ..	645	3·9	28·17	
Blackbird ...	Grade Holstein	Oct. ..	687	3·6	27·69	
Honeycomb ...	Shorthorn ...	23 Aug. ..	681	3·6	27·45	
Chocolate ...	..	5 Mar. ..	680	3·6	27·41	
Gin ...	..	Nov. ..	711	3·4	27·07	
Conceit ...	Ayrshire ...	28 Oct. ..	669	3·6	26·97	

A JIMBOOMBA DAIRY.

Mr. R. S. Sigley, an inspector under the Meat and Dairy Produce Act, has forwarded us the following description of Mr. Christopher Thompson's dairy buildings at Jimboomba, Logan River, together with three views of the buildings and of a remarkable oak-tree on Mr. Thos. Thompson's dairy farm, near Logan Village, which affords a magnificent shade for the cattle. Our artist, however, states that, owing to the peculiar style of painting, the pictures are quite unsuitable for reproduction by any process, and would give no correct idea of the place. This is to be regretted, as we are always pleased to present to our readers views of farmers' and settlers' homes.

Mr. Sigley says:—

The dairy room consists of a double building; the outer walls are made of lattice-work; size of outside walls, 22 feet by 20 feet. Height of walls, 7 feet; and from wall plate to top of iron roof, 7 feet 6 inches. The room inside is used as a separator and dairy room; it measures 12 feet by 10 feet by 9 feet 6 inches in height, is built of dressed pine boards, and has one door and three sliding wooden shutters; there is also a piece of wire netting nailed in front of the windows, to prevent any animals from entering the room during the time the shutters are left open. The windows are 3 feet by 3 feet.

The cream room has a pine roof.

There are benches inside the dairy room or cream room for the purpose of standing dishes of cream on until the carter calls for it for transit to factory or railway station, when it is put into cans and thoroughly mixed before leaving.

The floors of the cream room and of the passage between it and the outer walls are laid with concrete, and are washed over every day.

Distance between the walls of lattice and the cream room is 5 feet, forming a passage. In this passage Mr. Thompson has a weighbridge, and weighs his cream before it leaves the dairy. He finds this very beneficial, and no trouble about weight has been caused since purchasing this machine.

There is also a tank alongside the dairy room, with a tap led into the passage, providing water for washing utensils, &c.

At the end of the dairy room there is a door leading into a race, 40 feet by 5 feet, and 7 feet high to the top of the iron roof. This race is floored, and kept perfectly clean.

At the end of the race is a shed 17 feet by 15 feet, containing 5 bails on each side, where the calves are fed.

All the calves receive an equal ration daily, according to age.

From the time of receiving the milk in the dairy room, the separating, calf-feeding, and washing of utensils is done without going out of cover. The distance from the dairy room to any building is 1 chain, and from the cow shed 3 chains.

The cow shed measures 46 feet by 18 feet, with a passage down the centre for feeding purposes, and there are 9 bails on each side of the race.

Mr. Thompson is busily engaged in building two receiving yards, 112 feet by 112 feet each, and of split material, three rails, and a cap. In one corner of one receiving yard there will be three stalls—one for a bull and two for horses.

His barn is 28 feet by 14 feet to the wall plates, and there are three stalls on one side, forming a lean-to, which are floored with wood blocks, and are very neatly put down; there is also another lean-to on the opposite side, where all vehicles are kept.

Mr. Thompson has purchased a young shorthorn bull by Perfection, which was bred by Messrs. McIntyre Bros., of Christmas Creek, *viâ* Beaudesert. Perfection was bred in the Illawarra district, New South Wales, and has secured prizes in that district as well as in Queensland. Mr. Thompson's dairy premises are far superior to any in this district where dairy work is done by hand labour.

A LARGE SWAMP OAK-TREE.

The tree mentioned above has grown since the 1887 flood, and has had no cultivation. I measured the width of the ground covered by the limbs, and found the distance to be 68 feet in one direction, and 64 feet in another. The total height is 65 feet. The circumference of the trunk, about 2 feet from the ground, is 7 feet 5 inches; from the ground to lowest branches, 6 feet. I have never noticed a tree of the kind equal to this one in size and symmetry.

The Horse.

HORSE-BREEDING.

By P. R. GORDON.

Recent heavy shipments of horses to Indian and other foreign ports have revealed the fact that the horse stocks of Queensland have not been of such a radically inferior quality as was generally represented. It was, no doubt, the case that the class of horses shipped to South Africa during the war justified the severe criticism passed upon them by Imperial remount officers, but it has to be remembered that these had to be hurriedly selected, principally in the coastal districts, where, as is well known, the breeds had been allowed to degenerate, partly from the fact that the long-prevailing low prices did not justify expenditure in the introduction of fresh blood, but principally from the fact that on the coast watershed generally there is an absence of lime and other constituents necessary for bone-making, rendering it unsuited for horse-breeding without the aid of artificial feeding. Many of the shipments from these shores during the past four years, although far from first class, have been of a very useful description, principally collected in the Western districts; and, from the number of high-class sires that have been imported into the State from England, the other States, and New Zealand, since the breaking up of the drought in 1903, a much better class of horses will now come into the market. The description of stud horses introduced of late has been stout thoroughbreds, some fine specimens of the Suffolk Punch, a few good sires of the Clydesdale breed, and some remarkably good pony stallions. The establishment of mounted infantry regiments has created a very keen demand for ponies from 14'2 but not exceeding 15 hands, and even 13-hand ponies are valuable property in England and Ireland at the present time. The Exmoor breed of ponies is being largely drawn upon in the production of these. For some years buyers for India had loudly complained of the want of bone in our horse stocks, and they almost unanimously recommended the use of Suffolk sires to correct this fault; and a Select Committee of our Legislature recommended the same course. Several breeders responded by the importation from England and from popular studs in the Hunter district of New South Wales of some very superior sires of that breed. In a previous contribution to the columns of your Journal, I recommended the adoption of that course, not from any fancy for that type of cross, but to meet a strong prevailing demand on the part of foreign buyers; recognising the fact that, in horse-breeding as in wool-growing, the best-paying product has to be studied, even at the expense of sinking private opinion. It has not fallen to my lot to see many of the results of the Suffolk cross in this State; but, during a visit to the Northern Rivers of New South Wales two years ago, I had occasion to see several specimens of it, and had to admit that, however suitable it may be for collar work, the cross was certainly unattractive as saddle horses. I had the assurance of the owners, however, that the cross produced hardy slaves. This statement must be qualified by the fact that I had no opportunity of seeing the dams of the horses. The resort to any sudden cross, even as a matter of expediency to meet a passing demand, should be very carefully considered before adoption, bearing in mind that sudden crosses are apt to get beyond the control of the breeder. For superior saddle horses—in the absence of the Arab—there is no description equal to a stout English or Irish thoroughbred.

particularly the latter. Some superior stamps of horses of that description have during the past four years passed through Brisbane for the interior. It is difficult, however, to obtain such a horse. The purchase of a sire that has been successful on the turf is beyond the resources of a breeder of a bush stud. Many of the best qualities of the thoroughbred, notably that of endurance, have been sacrificed to mere speed, for which short light-weight races and the substitution of handicaps for weight-for-age races have been responsible. I have on several occasions pointed out that the principle of the handicap is to give the worst an equal chance with the best in a race. But, so long as gambling is permitted to be closely associated with the turf, there will be small chance of getting rid of this vicious principle. In alluding to the Arab, it should be understood that the reference was to the true Arab, not to the spurious article that has but too frequently been imported from India. There is a strong demand for what are here known as "gunners" and for heavy cavalry horses. It was for the production of these that the foreign buyers so strongly urged the use of the Suffolk blood. It is a debated question as to whether the Suffolk or the Clydesdale would be the best suited for giving the increased bone and weight. On this question I had the advantage of an interview with Warrant Officer Catchpole, who has probably had greater experience on that subject than any other man in Queensland. An artillery horse must have activity as well as weight, and Warrant Officer Catchpole's description of an ideal gun horse tallies precisely with what we could here produce by mating a well-bred hackney stallion with an active Clydesdale mare; while for heavy cavalry a typical animal, as described by him, would appear to be the product of a second thoroughbred cross on a Clydesdale or Suffolk mare. It appears that the hairy fetlocks of the Scottish horse would be no detriment, as trimming in the cavalry regiments is resorted to. But, after all, the percentage of heavy horses in demand is small compared with that for saddle and light harness purposes, and it will occur to breeders of long experience that, in the production of these, the use of either Suffolk or Clydesdale blood should be used with great caution, remembering that an alloy is easily introduced, but very difficult to breed out.

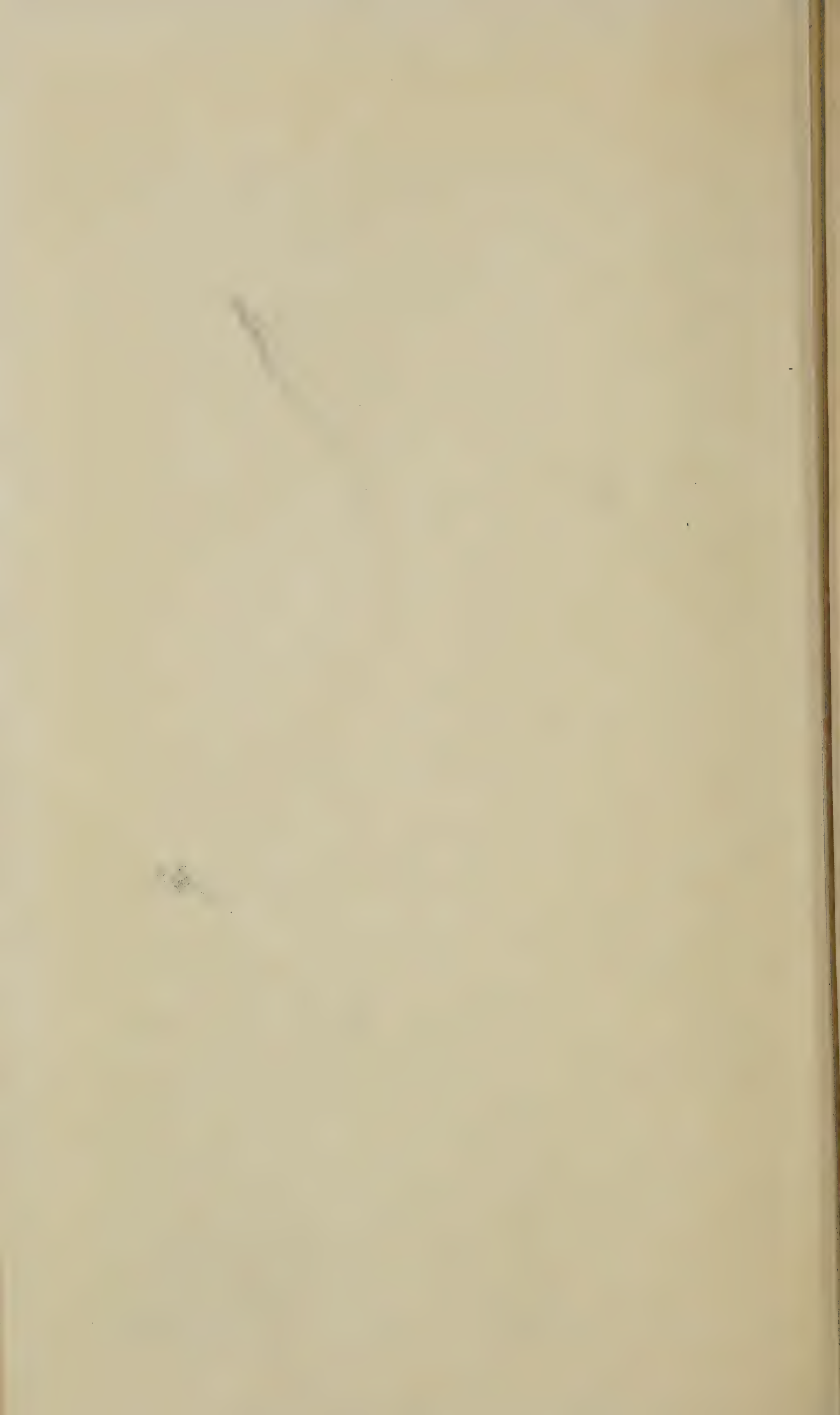
THE JACKSON POTATO-DIGGER.

We have, in a previous issue, described the new potato-digger patented by Mr. Jackson, agricultural implement maker, of Toowong. Our illustration shows the very simple light-running machine, which does the work most effectually. It does not grade the potatoes, but it takes them up so well that not a single potato can be found in the ground after it has passed over the field. Two horses are quite equal to working the machine during the day. We believe that Mr. Jackson has invented a machine which will reduce potato-digging to a pastime instead of a labour.

Plate V.



THE JACKSON POTATO DIGGER.



Botany.

CONTRIBUTIONS TO THE FLORA OF QUEENSLAND.

By F. MANSON BAILEY, F.L.S., Colonial Botanist.

Order GRAMINEÆ.

TRIBE BAMBUSEÆ.

ARUNDINARIA, Mich.

Spikelets 1-many-flowered, compressed, usually all bisexual, except sometimes the terminal, often sheathed; empty glumes 2, unequal, membranous; flowering glumes longer, obtuse acute, or mucronate, many-nerved; palea 2-keeled. Lodicules 3-ciliate. Stamens 3, rarely up to 6. Ovary globose above; style short, stigmas 2-3-plumose. Grain ovoid or narrowly-oblong, dorsally furrowed, included in the glume and palea. Erect or climbing shrubs. Stems slender, nodes usually prominent, internodes rather short, branches short fascicled. Stem sheaths papery, straw-coloured, blades subulate. Leaves usually small, jointed on the sheath. Inflorescence on separate stems or terminal, or on leafing branches. Species, about 50: 14 in America, 1 in Africa, the rest being Asiatic.—Gamble, in Hook. Fl. Brit. Ind. VII. 376.

? **A. Coboni**, *Bail.* Stems caespitose, erect, 26 or more ft. high, diameter $1\frac{1}{2}$ in. or probably more, nodes but slightly enlarged, internodes 1 to 2 ft. long, walls thin, about 2-piths of the stem diameter; branchlets fasciculate at the nodes. Leaves from 12 to 15 in. long, 2 to $2\frac{1}{2}$ in. broad, texture thin, lanceolate-oblong, base undulate, scarcely petiolate, midrib smooth, light-coloured longitudinal nerves about 12 on either side of midrib, very slender, and closely tessellated by horizontal veinlets, also dotted with numerous pellucid glands, margins slightly rough. Ligula composed of a row of stiff bristles 3 or 4 lines long; sheaths keeled; bristly at the top, otherwise nearly glabrous.

This present bamboo differs considerably from the tall climbing one of the Russell River scrubs, but, as the inflorescence of both so far are unknown, their respective positions cannot as yet be definitely assigned. The distinction is shown especially in their habit and structure—the one having upright, the other climbing stems, with in one thick the other thin walls.

This plant is found on rich land adjacent to running water, at an elevation of about 500 ft. The aborigines do a small trade in exchange for black-palm spears.—J. J. C.

Hab. : Head of the Stareke River, *James J. Cobon.*

Horticulture

FLOWER GARDENING.

By THE EDITOR.

INTRODUCTION.

Most people are fond of flowers, and can admire a pretty garden; but, in many cases, they have not the elementary knowledge necessary to enable them to successfully form a flower garden which shall be in bloom throughout the year. It needs only a glance at the Brisbane Botanical Garden, so excellently managed by the present Director, Mr. J. F. Bailey, and the beautiful, ever-blooming garden at the Executive Buildings, so well cared for by Mr. R. Soutter; or, again, the artistically laid out and tastefully arranged Botanical Gardens at Toowoomba, under Mr. Harding's fostering care, to see what can be done in the way of beautifying the surroundings of the suburban or country home. To assist would-be horticulturists, I have compiled the following information and instruction in flower gardening from the best authorities on the subject, professional and amateur, and also from their latest papers, lectures, and pamphlets on the various flowering plants, shrubs, and trees suitable to the Queensland climate generally. This has involved the comparison of many of these authorities, and, as a result, I have tried to render the work as practical as possible, leaving out as much as could be reasonably eliminated of scientific and professional terms, so as to make it easily intelligible to those for whose guidance it is intended.

HORTICULTURE.

In our sunny Queensland, where all the flowers of tropical, sub-tropical, and temperate climates can be grown out of doors, few people realise to what perfection the extensive cultivation of flowers has been brought in some countries which would scorn to be debarred by their climate from such an enjoyment. No doubt, in years to come, when civilisation is more advanced, and there will be more leisure than is usually available to the pioneer in a new land, an ennobling taste for flowers will also develop in our midst, and, in addition to the simple delight of beautifying the home, a lucrative trade in cut flowers and pot plants will arise. Meanwhile, let everyone blessed with the possession of a home make it homely and attractive by surrounding it with a few of the less exacting flowers. Our opportunities in that direction are, perhaps, unique in the world. Then let us rise up and be equal to them. A few small beds of flowers around the family home are a constant source of pleasure, enjoyment, instruction, recreation, and in years to come, when we are wandering through the world, of the most pleasant recollections connected with our childhood.

When we look round the suburbs of Brisbane and compare the tasteful adornment of some of the country residences of city workers with others adjoining them, where no attempt has been made to beautify even the piece of land in front of the house, we cannot fail to be surprised at the neglect of so charming a relaxation after a day's work in the hot city offices and shops as gardening affords.

Horticulture is a most delightful hobby, and may, by its absorbing interest, become something more than a pastime. He who would lay out for himself a rural paradise here below, cannot do so more successfully than by planting trees and flowers. But how do many people set about this work?

Some plant trees merely to shut out their neighbours. There is another class who set apart a small plot of ground near the dwelling, and lay it out with a dash of so-called architectural skill, mostly of a varied and severe type, the beds diversified in form and size like a collection of animals in a zoo. Into these beds are jammed as many plants as the superficial area will accommodate, no allowance being made for future development. Could anything be more out of tune with Nature?

But even this is better than the usual condition of the back yard, where the picture usually presented to the public gaze is:—A washing boiler standing sad and lonely on three bricks, half buried in a healthy patch of *Sida retusa*. A few kerosene tins in various stages of decay; numerous variegated jam tins, intermixed with unchoppable blocks of wood from the wood heap. A few tired looking clothes props; a consumptive-looking peach-tree that does duty as a hen roost or supports a clothes line; and a rickety tumble-down fowlhouse.

And this is a common picture to be seen in almost every part of the State, the exceptions, as a rule, being the grounds surrounding the tenement of a German resident.

How to alter the picture is the next question. The first thing asked by those who have determined to make a garden is: "What will it cost?" That is a very natural and important question. To make a garden properly, you must take an active hand in the work yourself, remembering always that with ordinary common-sense any kind of soil can be converted into a garden for the production of flowers and vegetables.

The great secret in successful horticulture is a perfect knowledge of the seasons, so as to adapt each variety of cultivated flowers to the needful temperature and rainfall. Seasonable sowing, transplanting, and pruning, and seasonable working are the elements of success.

LAYING OUT THE GARDEN.

There are two ways of laying out a flower garden, and these are the "formal" and the so-called "landscape" or "natural" style. I will at once discard the formal garden as being quite unsuited to horticulturists, whether amateur or professional. In a garden, which is man's work, man's hand should be visible, showing some object in view. The garden should be designed with some apparent relation to the external shape of the house, and the beds so arranged that only portions of the garden can be seen at once from different points.

If the grounds available for the formation of a garden will lend themselves to the creation of a grass lawn in front of the house, so much the better, for nothing sets off a garden so well as a well-kept lawn, laid down with couch grass. If space will permit, the lawn should be circular, with a gravel path running round it, but if not the gravel path should lead from the front gate to the house. A flower border right round the house, or at least in front, should never be omitted. After the lawn has been marked out, flower beds corresponding to its shape may be cut out. But, before anything is done in this way, the soil must be thoroughly broken up, trenched, drained, manured, and levelled. It will then be ready to be laid out in beds.

The laying-out of the beds is a matter depending on the good taste and very often on the eccentricity of the gardener. Some prefer a rigidly geometrical appearance, like the formal Dutch garden. Others delight in irregular, scattered beds, traversed by winding grass or gravel paths, bounded by privet or *Duranta* hedges, with here and there light bamboo trellises and kiosks supporting flowering climbing plants. With the addition of a few shade trees, such as jacarandas, poincianas, albizzias, magnolias, &c., such a garden, well cared for, is always a never-ending source of pleasure and enjoyable employment for the owner. Wherever a plentiful supply of water is available, a small pond and one or two fountains will lend additional beauty to the natural garden.

There are many beautiful aquatic plants which will thrive in the pond, and others which can be grown to best advantage around its edge in the soil. In this climate, a bush-house is almost indispensable for shade-loving plants, such as orchids, many varieties of ferns, caladiums, primulas, gloxinias, calceolarias, cinerarias, &c. Rockeries again afford ample scope for further beautifying the garden.

HEDGES.

A well-trimmed hedge round a garden is always more pleasing to the eye than a paling or wire fence, and, with ordinary care and forethought, there is no difficulty in quickly producing a handsome and, at the same time, an impervious hedge. In ordinary good garden soil, it will suffice to dig a trench about 2 feet wide and from 12 to 15 inches deep along the fence, breaking up the soil well before returning it to the trench. Of the several kinds of plants suitable for hedges, the two best for the climate of Queensland are the privet and the *Duranta plumieri*, both blue and white. The latter makes the most rapid growth. It strikes freely from cuttings, is seldom touched by wandering stock, and forms a dense growth. In less than three years after rooted plants are put in, it will make a good hedge 4 to 5 feet high. If rooted plants are used, plant them about 15 inches apart, and cut down to about 6 inches. Cuttings should be placed at about half the distance apart (6 to 8 inches). These latter should be 12 inches long, and only two buds should be above the ground. See that the soil is pressed close to the base of the cutting. The operation should be performed in damp weather. Failing this, attention must be paid to watering until they have taken hold of the ground.

Evergreen hedges, such as the above, should be regularly pruned, preferably in the spring, and kept to a breadth of about 18 inches.

LAWNS.

The land having been prepared as above directed, the next thing to do will be the formation of the lawn. The ground must be well ploughed during the summer, if possible, and allowed to lie for a short time exposed to the action of the sun, wind, and rain before being harrowed down. The hand-dug lawn must, of course, be treated in the same way. The more the soil is worked, whether ploughed or dug, harrowed or raked, the better it will be for the future grass, since the more plant food is thus rendered available. All the grass, weeds, and other rubbish gathered by the harrow or rake must be burned either on the ground or close to it, and the ashes scattered over the surface of the worked ground. Now the latter has to be reduced to as fine a tilth as possible to enable it to slightly cover such small seeds as grass seeds. The necessity for draining the ground has already been pointed out. In order to give body to the soil for the establishment and future maintenance of the grass, bonedust should be sown before the seed at the rate of about 5 lb. per square perch. When sowing grass seed, it is well to mix it with fine ashes, by which means the small seed is more evenly distributed than if it were sown alone. To make a good lawn, thick sowing is imperative—1 lb. per square perch is quite little enough to produce a close, springy turf. As soon as the lawn is sown, harrow the seed in with a light brush harrow, which is preferable to using the rake. Then roll the ground with a heavy roller, to give firmness to the soil, and to prevent evaporation in dry weather and the scorching up of the young plants before they have become firmly rooted. During such weather, water frequently, both before and after the plants are up.

As soon as the grass is high enough to catch the scythe it must be closely mown, then rolled, and the process continued every week, because it ensures a close bottom being obtained.

TOP-DRESSING.

Whether the soil be rich or poor, the lawn will always benefit by an occasional top-dressing with bonedust, wood ashes, or other fertilisers. A good liquid top-dressing consists of fine mould, mixed with 1 oz. of nitrate of soda,

1 oz. of potash sulphate, dissolved in 4 gallons of water. Give a good watering with this solution immediately after top-dressing with solid fertilisers. Never use any chemical to destroy weeds on the lawn. They should be taken out by the roots by hand.

AN EFFECTIVE ROLLER.

As already stated, a lawn requires a good deal of rolling, and a roller is a rather expensive garden appliance. But a very cheap, and at the same time a very effective, roller has been constructed by a gentleman at Beaudesert. He sent the following description of it to a local newspaper:—

To those who do not wish to invest in the expensive article, the following description of one made by the writer may be, perhaps, useful. It has now been in use about twelve months, and up to the present has worked admirably. The cost of same amounts to no more than about 15s.; in fact, where sand and screenings for the cement part are handy, it can be made for less. The following instructions as to how to proceed may be clear to most:—

Get a galvanised-iron cylinder made by your plumber out of not less than 22-gauge iron, about 24 inches long and 15 inches in diameter, with the seam of same made on the inside; into each end fit two wooden circles out of 1-inch thick timber, exactly the same diameter—viz., 15 inches. Perhaps a shade more would be better, so as to make them fit tighter. In the centre of each of these wooden ends bore, say, a $\frac{3}{4}$ -inch hole, to take an iron bar (round), to act as the axle of the roller. Then get, say, half a barrow load of fine quarry screenings, the same quantity of clean white sand, and about 2 buckets of Portland cement, the proportions used to make a good solid binder being 1 part of cement to 2 parts of sand and screenings mixed. Of course, charges can be made stronger as desired. Perhaps it would be as well to get a bricklayer's advice as to the proportions in making the cement part. To fill your cylinder, insert one of the wooden ends into same, allowing it to stand flush with the outside edge; then stand on its end, inserting the bar of round iron (axle) in the hole already bored, allowing it to project about 2 inches through, to allow for a handle to be fastened on. Then get ready the cement, turning the mixture over well, and using it fairly wet, so as to fill up all crevices; fill up cylinder as quickly as possible, ramming the mixture well down. See that you have sufficient to fill the cylinder at one charge. Fill up to within an inch of the top; then put on the other wooden end, and allow the roller to stand until the cement is thoroughly set. For the handle, the same shape as that of an ordinary lawn mower, on a large scale, acts very well. Fit same on, and the roller is ready for use.

LAYING OUT THE BEDS.

Whatever may be the style of the beds, they should be symmetrical; they should not be too large, and sufficient space, whether of turf or gravel, should be left between them. The figures should be simple and without acute angles, complex figures are especially to be avoided, as they are difficult to plant effectively, difficult to keep neat and clean, and hence cause an increase of labour, with corresponding extra expense. The best way to lay out the beds is to first make a plan on paper, and then transfer it to the ground, the paper plan having been drawn to scale.

Having this plan to go by, the gardener will have no difficulty in laying out the beds symmetrically, as the garden line will enable him to strike circles on the ground as correctly as the compasses will on the paper.

Before a figure is begun, the ground must be trenched, levelled, raked, and rolled hard and smooth; a pointed stick will then make all the mark that is required, and a number of pegs to place in the portion of the figure that is to be preserved will suffice for the rest.

The walks should be laid out and formed with a rise of 2 inches at the centre, to prevent the lodgment of water. The surface gravel need not be deeper than 3 inches, as it is best to add a little annually, so as to maintain a

fresh appearance. Walks seldom require a foundation of metal, unless the soil be soft or moist, as is the case on the rich red and black soil of the Darling Downs and on the scrub lands generally.

ARRANGEMENTS OF PLANTS.

Plants may be arranged in either of two different modes—one in which each plant stands singly; the other in which a number of plants of the same species are arranged in a group. The adoption of either of these styles depends upon the size of the garden. Where the area of land is small, the single-plant or "dot" system must be chosen, otherwise there might not be room for the number of sorts it is desired to plant. But where the area of ground is larger, then the grouping system should be followed, in order that the same species or variety may not have to be duplicated.

The grouping style consists in planting a given number of plants of each species in a mass, of a size proportionate to the extent of ground, allowing each plant just as much space as, when grown up, will cause the group to appear as a whole, without being overcrowded. The strict rule of having only one group of each kind may, in certain cases, be departed from, as when it is desired to brighten parts of the plot by lilies or other gay flowering plants. The plants should be arranged according to height and colour, the dwarfiest in the front and the tallest at the back, for, though a slope perfectly level on the surface is not desirable, plants vary in height and bulk from one year to another to such an extent that there is little danger of perfect uniformity being produced. Of course, the groups should be irregular in form and size. The arrangement of colour is, however, of extreme importance, for, unless it is carried out in a scientific manner, the collection would fail in attractiveness. There should be no violent or jarring contrasts, and the season of flowering of each kind must be taken into account, so that there may be an equal proportion of flowers throughout the plot at all seasons.

WATERING PLANTS.

Of all the processes in gardening, watering is the one that is most frequently ill-performed. It is customary with amateur gardeners to wash the dust off garden plants by watering overhead. The idea is to clean the leaves, open the pores, and so give the poor plants a new lease of life. But this overhead watering is a great mistake. A too common method is to water little and often, by which the soil is hardened and the roots brought so near the surface that, in the event of the soil becoming dry, they are likely to perish. Many do not commence to water sufficiently early in the season until the plants show that they are suffering from the want of it, whereas watering should be commenced as soon as the soil begins to change from wet to dry, so as to keep up a full supply of moisture and enable the plants to take advantage of the high temperature, which they cannot do unless fully supplied with liquid food. When the flowers are out, care should be taken that too much water does not get on them, or they will be bleached by the sun, especially if watering is done in the morning. At any time water on the flowers is not good. The best time to water is in the evening. Give the plants water at the roots—as much as they will take up—and the tops will look after themselves. In order that the water may pass freely downwards, the soil should be loosened with a fork to as great a depth as can be done without coming in contact with the roots. The more water you give plants, the more they require. This is especially the case with the annuals. Take two of the same kind, stand one in water and just keep the soil of the other moist; the one in the water will flag more in the sun than the other.

MULCHING.

Watering should be followed or preceded by mulching, which has a most beneficial effect in retaining moisture in the soil. Mulching checks the fierceness of the sun's rays during the hot months, thereby keeping the surface cool,

retarding the evaporation of moisture, and protecting the surface roots. The operation of mulching consists in spreading on the surface of the soil around plants, shrubs, or trees (so as to entirely cover the roots) any light material that will sufficiently shade the ground without preventing the passage of rain into the soil. Various materials may be used as a mulch, such as rotting straw, decayed leaves and weeds, leaf mould, fine top soil, spent tan, and well-decayed manure. As neatness is requisite in a flower garden, the four latter materials will be found the best to use.

BUSH-HOUSES, FERNERY, AND ROCKERIES.

THE BUSH-HOUSE.

Not every amateur can afford to erect a greenhouse, yet, as there are many delicate plants which will perish or only drag out a miserable existence if planted in the open, some form of enclosed shelter for them is an absolute necessity. This may be easily provided by the erection of a bush-house, the materials for which are to be obtained, if not on the land itself, at least at no great distance in the neighbouring forests and scrubs. A bush-house should be proportioned, as to size, to the size of the garden. A convenient size is 20 feet long by 12 feet wide, and it will be found that a very large number of plants can be raised within this space. The timber requisite for the structure consists of a few strong, rough posts, wall-plates, and rafters, all of round bush timber. The height from the ground to the eaves may be from 8 to 10 feet. The roof may be flat instead of gabled, and the flat roof is generally more convenient than the latter. It must be remembered that the object of a bush-house is not to totally exclude the light, but merely to break up the sun's rays, and so to produce a diffused light instead of a fierce glare. This object is achieved by covering the roof with light brushwood, such as light branches of ti-tree or swamp oak. The covering should not be too thick, but just thick enough to, as I said, break the direct rays of the sun. The bushes are held in place by binding them down with wire to the rafters. The sides of the building require somewhat more shelter, especially on the side facing the prevailing wind. In this State, the westerly winds must be particularly guarded against. To protect the plants, then, whilst at the same time affording them sufficient air and light, the sides may be built up to the height with upright logs—to a height, say, of 4 feet—and the space above may be filled in with ti-tree held in place with wire stretched between the posts. A raised bed should be constructed along the two sides and end of the bush-house, and the centre may be occupied by a rockery for the reception of ferns, fern-trees, palms, &c. Baskets of wood or wire, hung from the rafters and tie-beams, containing graceful drooping plants of kinds which I will deal with later on, add great beauty to the bush-house.

FERNERY.

Without going beyond the limits of Queensland, a great variety of very beautiful ferns may be obtained without much difficulty, and with ordinary care most of these may be grown in the open. Nearly all ferns are shade-loving, and they can be grown to a high degree of perfection in the ordinary bush-house, where they may be either grown on the open beds or in pots. If the bush-house is sufficiently large, a rockery may be formed in it, with pools, small jets, and little streams of water. The soil should be of good quality, scrub soil for preference; but, if this be unobtainable, it should be enriched with vegetable mould or much-decayed cow dung in imitation of the natural vegetable soil of the glens or gullies in which ferns naturally luxuriate, whilst a compost, including peat soil, must be provided for those of delicate constitution. The stronger species require rich feeding, and, as soon as they are thoroughly established, should be occasionally watered with liquid manure. The soil should not be allowed to become dry; therefore, during the season of growth, heavy waterings should be given once or twice a week according to the

weather. The plants should be syringed daily or twice a day, morning and evening, during hot winds. They should be frequently examined, lest thrips or scale obtain a lodgment, which, if detected, should be immediately despatched—the thrips by means of strong soapsuds or tobacco water, the scale by sponging or syringing with a solution of kerosene and soft soap.

The fernery need not be confined to ferns alone, but may have an admixture of grasses, sedges, Phornium, and shade-loving shrubs, such as *Griselinia* and *Coprosma*.

Nearly all the dwarfer kinds and some others might be planted in the raised beds or in rustic pockets attached to the walls, while those of drooping habit could be hung up in baskets; then, if water is present in the shape of a fountain, *Hymenophyllums* and similar sorts could be placed within reach of the spray.

ROCKERY.

Now, as to the rockery. The best situation for a rockery is in some secluded place in the garden, where it is partially concealed. In forming a rockery, a good body of suitable soil should first be laid down, and shaped according to design; then the stones, or coral blocks, which should be of various sizes, bedded into it at varying depths, odd ones and groups of threes being placed outside the general design, especially at the base of the more prominent portions, some laid flat on the ground, others more or less buried. It should be always borne in mind that the primary object of a rockery is the growth of plants, and not the mere display of a heap of stones. The plants selected for growing on a rockery should include a large proportion of drooping, trailing, creeping, and climbing species; for the latter, a few forked stems of trees might be fixed at intervals.

Having now shortly set down the preliminary steps to be taken in the formation of a flower garden, the next thing is to describe the treatment and cultivation of different varieties of flowering plants, and to point out those which are more particularly adapted for out-of-door culture, for the bush-house, the fernery, the rockery, and the water. The subject of orchids will be dealt with in a separate chapter.

[TO BE CONTINUED.]

THE STRENGTH OF DIPS—UNRELIABILITY OF THE HYDROMETER.

Notwithstanding that the Department of Agriculture and Stock, so far back as 1904, instructed the stock inspectors that no mechanical means of testing dip fluids by the aid of the hydrometer or by spindles was to be relied upon, and that the only reliable test was by chemical analysis, some stockowners have, although warned by the inspectors, persisted in the use of the hydrometer, large numbers of which have been sold to dairy farmers. A case occurred during December last year, where a dairy farmer at Kholo dipped his calves in Royal Dip, the strength of which, as shown by the hydrometer, was three points below full strength. The result was that, up to the 14th December, nine calves had died, and a number of others were sick.

It is as well that stockowners should know that the so-called testers are unreliable.

In this case, the dip fluid has been analysed by the Agricultural Chemist, Mr. Brünnich, and was found to be of nearly double strength (An. 482). Mr. Brünnich recommended that the use of the hydrometer be stopped, as the test is quite useless and misleading. Many cattle have been killed by being dipped in fluids tested with the aid of hydrometers only, and the Department again desires to impress this fact on stockowners: *Chemical analysis alone will give a reliable test of the strength of dip fluids.* The stock inspectors have all been requested to caution stockowners to the above effect.



THE CRICKET-BAT WILLOW.

There is no country on the face of the earth better adapted for the growth of the willow than Queensland. On the Darling Downs, at Toowoomba, Clifton, Dalby, Warwick, and a host of other districts, the willow thrives to perfection. The willow and cricket are intimately associated, and cricket may be called the premier national game of Australia. But without the willow cricket would languish, and that there is danger of this result owing to the scarcity of the true cricket-bat willow will be apparent from an article on the subject which we take from the Journal of the Board of Agriculture, London. It would seem from this article that there is an excellent opportunity to establish a paying industry in willow timber, and we have no doubt that the attention of Mr. Mac Mahon, Director of Forests, will be given seriously to this branch of forestry.

Our illustrations are taken from the Kew Bulletin, No. 8, 1907.

The article referred to reads as follows:—

In recent years the supplies of willow adapted for the manufacture of cricket bats have become seriously limited, and prices have risen in proportion. At a sale of willow trees on Sir Walter Gilbey's estate at Sawbridgeworth, in February, 1906, the best "bat willow" realised prices estimated to be equivalent to about 7s. per cubic foot. The agent of a large estate in Essex is said to have declined an offer of £1,500 for the best 100 willows on the estate; and Mr. John Shaw, of the well-known firm of Shaw and Shrewsbury, of Nottingham, last winter offered £40 for a single tree. When it is remembered that trees have been known in favourable situations to reach a saleable size in twelve years (having in that period attained a girth of about 50 inches), these prices show that there is no timber so profitable at the present time as that of the cricket-bat willow. It is not surprising, therefore, that the attention of owners of land suitable for the growth of willows should have been attracted by this tree. As a matter of fact, a large number of willows have been planted during the last few years with a view to meeting the future demand. But we have it on the authority of Mr. Shaw, one of the largest buyers as well as a leading expert, that not more than one-fourth of the trees that are being planted are the best cricket-bat willow.

The identity of the true "bat willow" has always been obscure. The cricket bat-maker recognises the tree best suited to his purpose with infallible certainty, but the characters on which he relies are not characters on which the botanist

bases his distinctions. With a view to helping the planter to recognise the willow best suited for cricket bats, the matter has been investigated at the Royal Gardens, Kew, by Mr. W. J. Been, and the information available is published in the Kew Bulletin, No. 8, 1907.

The "Open-Bark" Willow (*Salix fragilis*, L.).—The two commonest terms used in describing willows from the bat-maker's standpoint are "open bark" and "close bark." There is no difficulty or mystery about the "open bark." It is the Crack Willow—the *Salix fragilis* of Linnaeus—a common tree on the banks of the Thames near Kew. Although a useful timber in other respects, it is of very inferior merit for the making of cricket bats. It is, in fact, used only for the manufacture of cheap bats for children.

The Best "Close-Bark" Willow (*Salix alba*, L., var. *caerulea*, Syme [*S. caerulea*, Smith]).—The willow selected by Mr. Shaw as the very best one for bat-making is a tree of markedly pyramidal habit; it is female, or seed-bearing; and it belongs to the bluish-leaved variety of the white willow. It is, therefore, a pyramidal form of *Salix alba*, var. *caerulea*. The bark is less rough than in *S. fragilis*, and the corrugations are less prominent, straighter, and more continuous up and down the trunk of the tree. The wood is white, and when it is being split does not part so easily as the "open bark" does, but splinters a good deal. This splintering, or tearing, down the cleft is regarded as an evidence of good quality.

According to Mr. Shaw, tree of this type are only to be found, at the present time, in the counties of Essex, Hertford, and Suffolk. A few trees were at one time growing in Kent and Surrey, but it is his belief that the true "bat willow" is no longer to be obtained there. Neither Cambridgeshire nor Lincolnshire has it, nor does it exist (except for recent plantings) north of the Trent. This all goes to show that this willow is a local form, and that only those "sets" can be relied on which have been obtained from the right district. *Salix alba*, var. *caerulea* is grown at Kew, where there are two fine specimens on the banks of the lake. But, although in character of leaf and fruit they are identical with the typical trees selected by Mr. Shaw on the Copped Hall Estate, in habit they are quite different. The trunks have forked low, and the habit is more spreading. Although some of the Copped Hall trees are growing in hedgerows, and have ample room for lateral development, their tapering pyramidal form is a most noticeable characteristic. This is associated with, and may in some measure be due to, a great vigour of growth.

In regard to quality of timber for cricket bats, the typical *S. alba* appears to be intermediate between *S. alba*, var. *caerulea*, and *S. viridis* (see below). Botanically, there is no well-marked dividing line between *S. alba* and *S. alba*, var. *caerulea*, the two being united by intermediate forms. It is possible that the quality of timber improves as the tree approaches the latter.

Salix viridis, Fries.—There is another willow recognised by Mr. Shaw as a "close bark" and of a useful quality, but still inferior to that of *Salix alba*, var. *caerulea*. Although it is not easy to put on paper the differences between the "open" bark of *S. fragilis* and the "close" bark of the true "bat willow" in such a way that they can be indubitably recognised, they are appreciated easily enough when seen in the field. But the differences between the two "close" barks are by no means obvious to the uninitiated, though the trees are distinct enough in other respects. The habit of this second tree is more spreading than of *S. alba*, var. *caerulea*; the leaf is smaller and not so blue; and the trees are presumably male. This tree is considered to be *Salix viridis*, Fries.

Salix viridis is a hybrid between *S. alba* and *S. fragilis*, and as these species frequently grow together they have no doubt crossbred very many times. It is quite probable also that the progeny have interbred with the parent species again. At any rate, *Salix viridis* is a very variable tree, showing numerous intermediate gradations between the two parents—sometimes approaching *S. alba*, and *S. alba*, var. *caerulea*, so closely in leaf as to

Plate VII.



THE "OPEN-BARK" WILLOW.

Salix fragilis, L.

Plate VIII.



THE BEST "CLOSE-BARK" WILLOW.

Salix alba, L., var. *caerulea*, Syme.

be indistinguishable from them, and sometimes showing very distinctly the influence of *S. fragilis*. Its advent into the cricket-bat willow question has created a good deal of confusion. A specimen approaching *S. alba*, var. *caerulea*, may be described as good by the bat-making expert, whereas another approaching *S. fragilis* will be accounted inferior. Yet to the botanist both are *S. viridis*.

From the bat-maker's point of view the timber of *Salix viridis* is not so good as that of *S. alba*, var. *caerulea*, because the wood is coarser and heavier. A bat made of good *S. viridis* timber would weigh about 2 lb. 7 oz. to the 2 lb. 4 oz. of *S. alba*, var. *caerulea*. The difference in market value is also so considerable as to be important to intending planters. Mr. Shaw stated that, for trees of equal size, buyers would give £10 for the *S. alba*, var. *caerulea*, but only £6 for the *S. viridis*.

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Salix Russelliana, Smith.—In connection with the "bat willow" question the name of *Salix Russelliana* frequently crops up, and is a source of considerable confusion. A correspondent of Kew complains that, whilst one person tells him that *Salix Russelliana* is an excellent willow for bat-making, another says that it is quite worthless. The probable explanation of this is that "Russelliana" is a name that has been given to two different willows. Most commonly it has been applied to the "crack willow" (*S. fragilis*); in that connection, therefore, it indicates the very inferior willow for bat-making. But the name has also been given to the hybrid between *Salix alba* and *S. fragilis*, which, as has already been explained, is itself a variable plant, but is often of good, although not the best, quality. The name "Russelliana" is now no longer used by the leading authorities on British willows, so that those interested in the cricket-bat willows would do well to discontinue its use.

Popular and Local Names.—Another source of confusion arises from the use of local names. So misleading are they that they should be dispensed with altogether in connection with the present question, since it is hopeless now to find one popular name restricted to one particular willow. A name given to a particular species or variety may be in general use in one district, but it may be given to quite a different tree in another. The term "Huntingdon willow" and "Leicestershire willow" have both been applied to *Salix alba*, to *Salix alba*, var. *caerulea*, and to *Salix fragilis*.

Propagation and Cultivation.—It will have been gathered from what has been said that there is at the present time a brisk demand for young trees or "sets" of the true "bat willow." Inquiries are being continually addressed to Kew as to where they can be obtained, but no one is known at the present time who is able and willing to supply them in quantity. It is of little use applying to the ordinary trade firms. With the best will and the most honest intentions they may supply the wrong tree, because, as has already been pointed out, it is not *Salix alba*, var. *caerulea*, merely that is wanted.

So far as our present knowledge takes us, it is the erect-growing form alone that can be relied on, and then possibly the female plant only, and it is only safe to plant stock which has come originally from the countries of Essex, Suffolk, or Herts.

The usual method of propagating this willow is by means of "sets." These "sets" are branches cut as thick as, or thicker than, a broom-handle, with the minor branches and twigs removed; they are thus transformed into bare rods which, when planted, are 8 to 10 ft. or even more in length. "Sets" of about

this length are preferred, so that the young growths may be out of reach of cattle, &c., and the young trees away from the various dangers that beset them when they are near the ground. They are also suitable for thrusting in hedge-rows and such like situations. Care should be taken to prevent cattle from injuring the stems. In some places willows are being pollarded for the especial purpose of producing "sets" of the desired size.

The willow is one of the most easily propagated of all trees, for every twig will grow, and the use of cuttings made of shoots as thick as a goose-quill and, say, 1 ft. long, is recommended. Cuttings of this character, planted in the Arboretum Nursery, at Kew, in the spring, were 6 feet high in August. For thicker wood the cuttings may be proportionately longer. These can be put in the ground in autumn or early spring. As they grow it would be necessary to keep them each to a single leader and to prune back the side branches and remove the lower ones as the plants grow in height. In well-kept nursery ground fine healthy plants could be produced in two or three seasons, and they could be grown to planting-out size at the rate of 8,000 or more to the acre.

Whilst these willows like abundant moisture, a position by the side of water is not necessary. Fine specimens are grown in deep, rather heavy clay, with only an ordinary hedge-row ditch on one side, and timber grown in such a position is preferred to that of trees growing close to the edge of ponds, &c.

Young trees should be watched to see that they are kept to a single leading shoot. This will obviate the forking of the trunk low down, which, of course, detracts from the value of the tree by reducing the amount of good timber. Trees, however, are more liable to fork when growing in isolated positions than they are when close together in plantations.

The article in the "Kew Bulletin" is illustrated and contains a botanical description of the willows considered.

Times of Sunrise and Sunset at Brisbane, 1908.

DATE.	JANUARY.		FEBRUARY.		MARCH.		APRIL.		PHASES OF THE MOON.
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	
1	4.56	6.45	5.20	6.42	5.41	6.20	5.57	5.46	4 Jan. ☉ New Moon 7 43 a.m.
2	4.57	6.46	5.21	6.42	5.41	6.19	5.58	5.45	10 " ☾ First Quarter 11 53 p.m.
3	4.58	6.46	5.22	6.41	5.42	6.18	5.58	5.44	18 " ☉ Full Moon 11 37 "
4	4.58	6.46	5.23	6.41	5.43	6.17	5.59	5.43	27 " ☾ Last Quarter 1 1 a.m.
5	4.59	6.46	5.23	6.40	5.43	6.16	6.0	5.41	
6	5.0	6.47	5.24	6.40	5.44	6.15	6.0	5.40	
7	5.0	6.47	5.25	6.39	5.44	6.14	6.1	5.39	
8	5.1	6.47	5.26	6.38	5.45	6.13	6.1	5.38	2 Feb. ☉ New Moon 6 36 p.m.
9	5.2	6.47	5.26	6.38	5.45	6.11	6.2	5.37	9 " ☾ First Quarter 2 27 "
10	5.2	6.47	5.27	6.37	5.46	6.10	6.2	5.36	17 " ☉ Full Moon 7 5 "
11	5.3	6.47	5.28	6.36	5.46	6.9	6.3	5.35	25 " ☾ Last Quarter 1 24 "
12	5.4	6.47	5.29	6.36	5.47	6.8	6.3	5.34	
13	5.5	6.47	5.29	6.35	5.47	6.7	6.4	5.33	
14	5.6	6.47	5.30	6.34	5.48	6.6	6.4	5.32	
15	5.6	6.47	5.31	6.33	5.49	6.5	6.5	5.31	
16	5.7	6.47	5.31	6.33	5.49	6.4	6.5	5.30	3 Mar. ☉ New Moon 4 57 a.m.
17	5.8	6.47	5.32	6.32	5.50	6.3	6.6	5.29	10 " ☾ First Quarter 7 42 "
18	5.9	6.47	5.33	6.31	5.50	6.2	6.6	5.28	18 " ☉ Full Moon 0 28 p.m.
19	5.10	6.47	5.34	6.30	5.51	6.1	6.7	5.27	25 " ☾ Last Quarter 10 32 "
20	5.10	6.47	5.34	6.29	5.52	5.59	6.7	5.26	
21	5.11	6.46	5.35	6.28	5.52	5.58	6.8	5.25	
22	5.12	6.46	5.36	6.28	5.53	5.57	6.8	5.24	
23	5.13	6.46	5.36	6.27	5.53	5.56	6.9	5.23	
24	5.14	6.46	5.37	6.26	5.54	5.55	6.9	5.22	1 Apr. ☉ New Moon 3 2 p.m.
25	5.14	6.45	5.38	6.25	5.54	5.54	6.10	5.21	9 " ☾ First Quarter 2 32 a.m.
26	5.15	6.45	5.38	6.24	5.54	5.53	6.11	5.20	17 " ☉ Full Moon 2 55 "
27	5.16	6.45	5.39	6.23	5.55	5.52	6.11	5.20	24 " ☾ Last Quarter 5 7 "
28	5.17	6.44	5.39	6.22	5.55	5.50	6.12	5.19	
29	5.18	6.44	5.40	6.21	5.56	5.49	6.12	5.18	
30	5.19	6.43	...	...	5.56	5.48	6.13	5.17	
31	5.19	6.43	...	...	5.57	5.47	...	...	

Tropical Industries.

NEGLECTED INDUSTRIES.

CASTOR OIL PLANT (*RICINUS COMMUNIS*).

By THE EDITOR.

Of late there has been considerable inquiry about the possibilities of the castor oil plant as a payable farm crop. There is ample evidence that the plant will thrive anywhere almost on the coast lands of Queensland. In and around Brisbane it may be seen growing and bearing heavy crops of seed in all sorts of out-of-the-way places, on the river banks, in quarries, on unoccupied allotments, but no attention has ever been given to it with a view to turning what is looked upon as almost a noxious weed to profitable account. Most people, especially children, know to their sorrow that castor oil is a most valuable medicine, but not many are aware of the large quantities which are used for lubricating and illuminating purposes. In India it is used on all the railways in the signal and carriage lamps, owing to the brilliancy and safety of the light. It burns very slowly, and thus is more economic than other oils. The plant is exceedingly hardy, and will stand a wide range of climate. The seeds have extraordinary vitality. Oil seeds as a rule quickly lose their germinating power, but the castor seed appears to be an exception. A few weeks ago I obtained two or three seeds from the Colonial Botanist, Mr. F. M. Bailey. These seeds had been in a glass bottle in the Museum of the Department of Agriculture and Stock to my own knowledge for ten years, and Mr. Bailey thought they had lain there for fifteen years. Be that as it may, we both planted the seeds. They quickly germinated, and are now forming fine healthy plants.

In a tropical climate the plant becomes a perennial tree instead of an annual, and attains a height of from 20 to 30 feet. The best soil for castor is much like that required for the cotton plant—a rich well-drained, sandy loam. It will not thrive on heavy wet soils. As the roots penetrate very deeply, the land must be deeply ploughed and well worked. The seed is planted in rows from 6 to 8 feet apart each way, three or four seeds being planted in a hole. Before planting, the seeds should be softened by having hot water poured over them and then being left to soak for twenty-four hours. In about ten days after sowing they will germinate; and when the plants are 8 or 10 inches high, the three weakest plants must be taken up when four seeds have been put in. They grow very rapidly, and begin to bear in four months. Like the coffee and cotton plants, the castor plant would grow to an inconvenient height if left to itself. It should, therefore, be kept low by pinching back the main stem. This will have the further effect of causing the plant to throw out many more fruit spikes than it would otherwise do. I have never seen the castor oil leaves or spikes attached by any insect or fungus pest; in fact, all insects avoid it. When, however, the tree gets old, the usual scale insect, the *Coccus*, attacks the bark. They have to be dealt with, as in the case of citrus fruit and other trees, by spraying or brushing with kerosene emulsion.

When the capsules begin to turn brown, it is time to begin the harvest. This is done by cutting off the spikes and removing them as soon as possible to the barn. The work of harvesting must be done rapidly, for if the seeds are allowed to ripen on the tree the dry pods burst open, and the seeds, being liberated, fly off in all directions. This "popping" of the capsules makes the matter of freeing the seeds a very simple one. All that has to be done is to prepare a drying ground either in a shed or in the open. The ground should either be boarded or swept quite clean. When the spikes are brought in they

should be spread out on the drying ground to a depth of from 6 inches to 1 foot according to the heat of the weather. Should rain occur when out-of-door drying is being carried on, draw the spikes into heaps and cover with tarpaulin. Turn the spikes over frequently to let all get the benefit of the sun. The capsules will soon begin to burst, and in four or five days they will have shed all their seeds. All that remains to be done is to sift or winnow out the husks. The return from an acre is about 20 bushels, and the seed meets with ready sale in Europe and in the United States. A bushel of castor beans weighs 46 lb. Now that Messrs. Kitchen and Sons have established a cotton ginnery in Brisbane, and go in largely for the manufacture of cotton-seed oil, it is probable that they would also be purchasers of other oil-yielding seeds, including castor-oil seeds, sesame, cajeput, and others. At present we cannot give any idea of the price which could be obtained for castor seeds.

THE FIRST FOURCROYA PLANT AT OXLEY CREEK.

The accompanying photograph, taken in 1864, shows the first fibre plant of the *Fourcroya gigantea* family growing in the garden of the head teacher of what was then known as the West Oxley Primary School (now Sherwood). Major Boyd, who was at that time in charge of the school, obtained the plant from the late Captain Dawson, of the Black Ball ship "Saldanha," by which ship the former arrived in Queensland in 1862. The plant grew luxuriantly, and, had the cultivation of fibre plants been carried on from that date, Queensland would to-day have been exporting thousands of tons of the fibre, and hundreds of subsequent cane farmers, instead of being ruined as they were in 1872, would now have been wealthy men, for, in the forty-three years which have since elapsed, 100 acres of sisal would have produced 4,300 tons of fibre of a value of £34,400.

A GOOD POISON FOR CROWS.

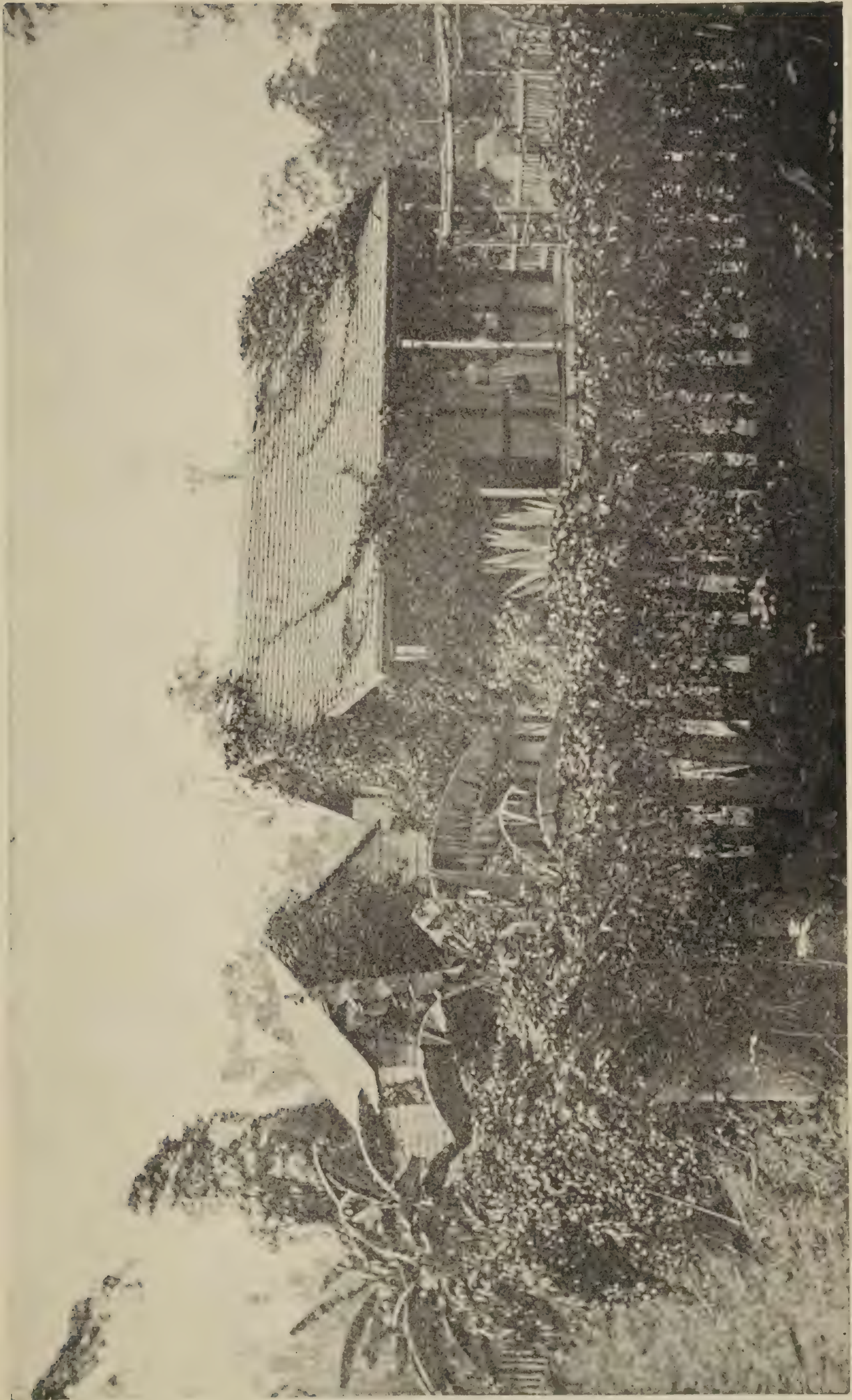
Mr. Gaskell, a farmer at Zillmere, has given us what appears to be, from a description of its action in the "Farmer and Settler," a good recipe for the destruction of crows. A Mr. Robertson reported having made certain successful experiments in poisoning these wary birds by means of a rabbit poison called S.A.P. (the initials of the manufacturers). He reported his method thus: "I put it on the carcass of the sheep after it is skinned, or I put it in fat and place the bait on a skin in the paddock. The crows take it as they take nothing else, and they die very suddenly. I have tried all other poisons—strychnine, arsenic, &c., without any visible result, but 'S.A.P.' has proved eminently satisfactory." Pastoralists report that they use it direct from the tin, rubbing it inside the freshly killed sheepskin, which they hang on the fence; or they cut a slit in some fat meat and place the "S.A.P." in that. This preparation is pleasant to the taste, and the crows do not spit it out as they do strychnine; perhaps, too, its stickiness prevents their getting it out of their mouth.

Mr. C. W. White, of Muswellbrook, uses this method: Melt fat, and, when it is beginning to thicken in cooling, mix "S.A.P." in it, stirring with a stick. When cool, make the mixture into pills about the size of a marble. Open the carcass of the sheep, so as to leave the liver bare, and smear it well with the mixture, cutting the liver with a knife; also, place the pills on the sheepskins or on the ground near the carcass.

By this means, says Mr. White, I poisoned fully 200 crows in three weeks, and there are very few crows now to be seen where there formerly appeared to be many hundreds. The crows pick up the baits, go straight to the water, and die almost immediately.

Other graziers report similar success.

Plate VI.



THE FIRST SISAL PLANT AT WEST OXLEY (SHERWOOD), 1864.

Chemistry.

ELEMENTARY LESSONS ON THE CHEMISTRY OF THE FARM, DAIRY, AND HOUSEHOLD.

By J. C. BRÜNNICH, Agricultural Chemist.

TWENTY-FIRST LESSON.

MILK: THE CHEMICAL COMPOSITION OF MILK OF VARIOUS ANIMALS. COW'S MILK: THE INFLUENCE OF VARIOUS FACTORS ON QUALITY AND QUANTITY OF MILK. MILK STANDARD UNDER HEALTH ACT. PASTEURISATION AND STERILISATION. CREAM, BUTTER, AND CHEESE.

Already in our Seventeenth Lesson we learned that milk is the normal secretion of the mammary glands of animals, and that its principal constituents may be classified into:

Water, Fat, Proteins, Sugar, and Mineral Salts or Ash.

The fat of milk, generally called **butter fat**, is a variable mixture of glycerine salts of fatty acids, and consists principally of the harder fats—*palmitin* and *stearin*—the glycerides of palmitic and stearic acids, and the softer fats—*olein* and *butyrin*—the salts of oleic and butyric acids. There are always present small amounts of the glycerides of other acids, as myristic acid, lauric acid, caproic acid, &c., which play an important part in giving butter fat the peculiar character, aroma, and flavour. All these fats may be split up into free glycerine and alkali salts of fatty acids (*soaps*) by treating them with alkalies (*saponification of fats*), and from the alkali salts of fatty acids the free fatty acids may be obtained by treating them with dilute mineral acids. Some of these fatty acids, like palmitic, stearic, oleic, myristic, and lauric acids, are solids, insoluble in water and non-volatile; whereas fatty acids, as butyric, caproic acids, &c., are more or less soluble in water and volatile; and the comparatively large amount of volatile fatty acids of butter fat distinguishes it from other animal fats.

The fat exists in milk in the form of exceedingly minute globules of varying size, which in an average have a diameter of about 1-10,000th of an inch, and are so numerous that one drop of milk may contain about 100,000,000 of fat globules. The size of these globules varies in the milk of the different breeds of cows; the milk from cows of the Jersey and Guernsey breed have relatively large globules, whereas the milk of Ayrshires has very small fat globules. In the milk from the same cow the size of globules changes during the period of lactation, and the size gradually decreases towards the end of the milking period.

Some scientists upheld the hypothesis that each of the fat globules is surrounded by a membrane; others, again, believe that they are enclosed by a slimy albuminous skin; but there is hardly sufficient evidence to support these theories, and it is now generally believed that the fat is in the form of a true emulsion, with the free fat globules floating in the milk serum.

The number and nature of **proteins** in milk is also a matter of dispute, but at the present day the existence of three or four proteins is generally accepted. The principal of these nitrogenous compounds is **casein** or **caseinogen**, which coagulates in the form of *curd* when milk gets sour. The composition of this protein is, in accordance to Chiltenden and Painter's investigations, as follows:—Carbon, 53.30 per cent.; hydrogen, 7.07 per cent.; oxygen, 22.03 per cent.; nitrogen, 15.91 per cent.; phosphorus,

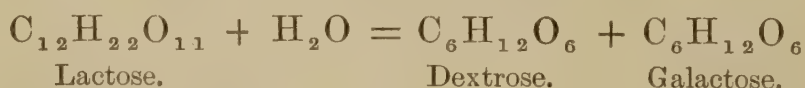
87 per cent.; and sulphur, 82 per cent.; from which percentage amounts Richmond calculates the chemical formula to be $C_{172}H_{274}N_{44}S.P.O_{55}$.

Pure casein is insoluble in water, but, having a weak acid character, it combines with bases to form soluble salts, and in milk casein exists as a neutral lime salt—calcium casein—containing from 1.4 to 1.75 per cent. of lime, CaO , and this soluble casein gives milk the peculiar white opaque appearance. When heating milk to boiling point, this protein does not coagulate, but when heating to a higher temperature under pressure coagulation can be produced. A slight coagulation on heating takes place, in producing on the surface of the milk a thin skin. If milk has reached a certain acidity, the casein coagulates when heated to 167 degrees. On the addition of dilute mineral acids to milk, casein, free from lime, is coagulated in the form of a flocculent precipitate, which redissolves easily when treated with dilute alkaline solutions. The casein is also soluble in excess of acids. The curd precipitated by weak acids encloses nearly all the fat globules. The coagulation of casein may be also produced by the action of **rennet**, which contains a peculiar enzyme chymosin, and this curd is of a different nature than that produced by acids, as it consists of an insoluble lime salt of *paracasein*. Different kinds of milk produce a different form of curd; human milk, and also the milk of mares and asses, gives a very soft flocculent casein, whereas cow's milk produces a solid mass of curd.

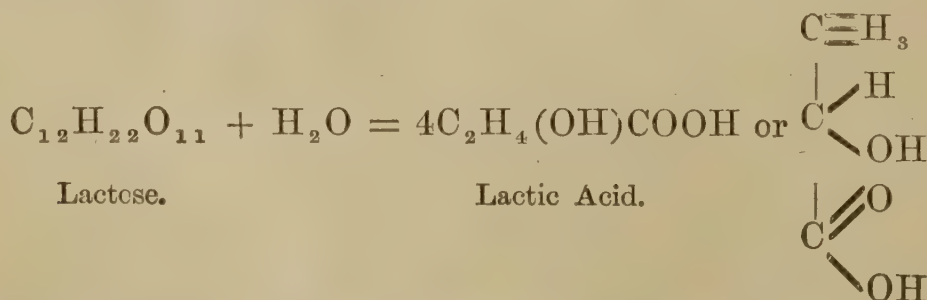
Milk albumin, or *lact albumin*, which closely resembles the serum albumin found in blood, exists in milk in the form of a true solution; it is not coagulated by rennet, and for this reason remains in the *whey*, which separates from the curd. This protein is not coagulated by acids, but coagulates on heating, and also precipitated from its solution by saturating it with sodium sulphate and ammonium sulphate, and by adding solutions of copper, lead, mercury salts, and by alcohol and tannin solution.

Milk globulin occurs in milk in a small quantity only, although the *colostrum*, the secretion of the udder at the time of calving, contains a larger amount of this compound. It resembles in its properties the lact albumin. Milk also contains a small amount of a **fibrin**, and also an enzyme or unorganised ferment—**galactose**—which in its action resembles pepsin in having a slow action on the milk proteins, and changing them into peptones, and for this reason plays an important part in the ripening of cheese.

Milk sugar or **lactose** is always found in milk in solution. It resembles ordinary sugar, but is less soluble in water and not so sweet. This sugar is one of the disaccharides, and by the action of dilute acids and certain ferments it consequently splits up into two monosaccharides—



By further fermentation the sugar is changed into lactic acid and traces of other organic acids and compounds, which are all of importance in the manufacture of cheese and butter—



As **lactic acid** is quite easily produced from milk sugar, it must be considered a normal constituent of milk, as immediately after milking small amounts of this acid can be detected, which amount rapidly increases as the milk is allowed to stand.

The mineral salts of milk are left in the form of *ash* when milk is evaporated to dryness and incinerated, which consists chiefly of lime, potash, soda, and magnesia, with traces of iron in combination with phosphoric acid and chlorine. In the milk itself some of the bases are in combination with organic acids, among which citric acid is always present in small amounts. The amount of ash is fairly constant, and averages about .7 per cent.

Many other organic compounds, like *urea*, *kreatin*, *lecithin*, &c., are always found in small quantities in normal milk; and milk, furthermore, contains always a small but appreciable amount of *carbonic acid gas* and smaller amounts of the gases *nitrogen* and *oxygen* in solution.

The composition of normal cow's milk may be shown by the following table, which also gives the average amount of the constituents in percentage of the weight:—

Cow's Milk ...	Water. 87.1 %		} <i>Milk Serum.</i>	{ Casein, 2.5 % Albumin, .7 % Globulin, &c., traces
	Solids. 12.9 %	{ Solids not Fat. 9.0 % Fat. 3.9 %		
		Gases Traces	{ Proteins, 3.2 % Milk sugar, 5.1 % Ash, .7 % Other organic compounds, traces	
			{ Carbonic acid Nitrogen Oxygen	

It is interesting to compare this composition of cow's milk with the milk of other animals, and we must note that not only the percentage of the chemical constituents shows a great variation, but that, also, the nature of these constituents, more particularly of the proteins and fats, differs in these milks. According to Richmond and others, the following table gives the composition of various milks:—

	Water.	Fat.	Sugar.	Proteins.	Ash.
Cow	87.1	3.9	4.8	3.4	.75
Goat	86.0	4.6	4.2	4.4	.76
Ewe	78.7	8.9	5.1	6.3	1.01
Buffalo	82.6	7.6	4.7	4.1	.90
Woman	88.2	3.3	6.8	1.5	.20
Mare	89.8	1.2	6.9	1.8	.30
Ass	90.1	1.3	6.5	1.7	.46
Cat	81.6	3.3	4.9	9.1	.58
Sow	87.0	4.6	3.1	7.2	1.05
Elephant	67.9	19.6	8.8	3.1	.65
Porpoise	41.1	48.5	1.3	11.2	.57

Cow's milk itself can show a considerable variation in its composition, which is influenced by many circumstances, as age, breed, health of the animals, by period of lactation, food, climate, &c.

We will now consider the influences of these various factors on the composition and more particularly with regard to the amount of butter fat.

(a) **Influence of Breed.**—We have already learned that the different breeds of cows show a difference in the milk with regard to the size of the fat globules, and this variation has a great influence on the separation of the cream from the milk, so that from the milk from Jersey cows the fat separates out much quicker and easier than from the milk of Holsteins and Ayrshires, in the milk of which the number of large globules is very small and very minute globules predominate.

The amount of fat also varies in the milk from the different breeds; and from the results of investigations carried out at the New York Experiment

Station the following amounts of fat was found in the milk of cows of different breeds:—

Name of Breed.	Percentage of Butter Fat in Milk.		
	Average.	Lowest.	Highest.
Holstein Friesian	3·36	2·88	3·85
Ayrshire	3·60	3·20	4·24
American Holderness	3·73	3·49	3·92
Shorthorn	4·44	4·28	4·56
Devon	4·60	4·30	5·23
Guernsey	5·30	4·51	6·13
Jersey	5·60	4·96	6·09

The composition of the milk with regard to the other constituents is much more constant, and it was found that the amount of casein varied between 3·4 and 3·9 per cent., milk sugar between 4·8 and 5·3 per cent., and the ash between ·698 and ·760 per cent.

(b) **Influence of the individuality of the Cow.**—As shown by the preceding table, the variation between the lowest and highest amounts of butter fat is very considerable in some of the breeds, and this variation is frequently due to individual peculiarities of the cows. In every dairy herd certain cows may be found which give a milk much richer in fat, whereas other cows of the same breed give a yield below the average. This peculiarity is generally transmitted to the offspring, and for this reason it is of the greatest importance that every dairyman should know the yield and composition of the milk of every cow, so that he is able to pick out his best cows for breeding in order to build up a more valuable dairy herd. It is very little trouble to weigh the milk given by each cow, and the determination of the amount of butter fat by the Babcock tester can be done by anyone after a little practice. From the weight of milk and the test, the true daily yield of butter is easily calculated; and, in order to enable our farmers to do this work, I will give a short description of the milk-testing and necessary calculations in our next lessons.

(c) **Influence of Age.**—Between the third and fourth period of lactation the quality of milk of every cow is generally at its best, and a very slight and gradual decrease in the richness of the milk is, as a rule, the result of age.

(d) **Influence of the period of Lactation.**—At the time of calving the udder is filled with a peculiar slimy, viscous, yellowish liquid, the **colostrum**, which continues to be secreted for a few days after parturition and changes them rapidly into normal milk. The colostrum contains a very high amount of proteins, and is easily coagulated when heated. It also contains more ash and less milk sugar than ordinary milk. It has a distinct acid reaction, and is not easily curdled by rennet. The amount of total solids in the milk generally decreases during the first few months after calving, and then again gradually increases as the stage of lactation advances. The same applies to the amount of fat, which also increases steadily after the second or third month. At the same time the quantity of milk decreases towards the end of the lactation period.

(e) **Influence of milking and time of milking.**—As a rule, cows are milked twice a day—early in the morning and in the afternoon or evening—and it is generally found that the evening's milk is richer in fat than the morning's milk; at the same time the quantity of evening's milk is usually less than the amount of morning's milk. With some cows this variation may be very considerable, whereas other cows yield practically the same amount of butter fat in the two milkings. The milk first drawn from the udder is always poor in fat, and the richness increases towards the end of the milking, and the last strippings are very rich in fat. The milk first drawn has been found to contain only from $\frac{1}{2}$ to 1 per cent, of fat, whereas the strippings may contain as much as 10 per cent. For this reason thorough milking with careful stripping is absolutely necessary in order to attain a maximum amount of butter fat.

Altering the hour of milking may seriously interfere with the yield of milk, and the treatment of cows before and after milking and the manner of milking itself have an effect on quality and quantity of the milk.

(f) **A daily variation** in the yield and quality of milk which may be frequently observed, and which in some cases may be very considerable, may be caused by a great many slight disturbances, brought about by some of the influences already mentioned, and again by changes of food, water, climatic conditions, change of the attendants and milkers, slight sickness, &c. Like in all other variations, the percentage of fat shows the greatest variations, whereas the amount of casein varies within narrow limits, and the amount of milk sugar and ash may be considered as almost constant.

(g) **Influence of Food.**—The quantity and quality of food given to a milking cow may have a very notable effect on the milk yield, and more particularly with regard to the quantity of milk. The improvement in the amount of butter fat will generally be between narrow limits for well-nourished cows. The effect of food on flavour has already been referred to in a previous lesson. The actual variation produced by a change of food may be very considerable, and I must draw attention to the result of some of the feeding experiments carried out at the Agricultural College at Gatton (reported in the annual report of 1907) in which the milk from ten cows of different breeds, milked for six weeks, with different rations every week, gave weekly average yields of commercial butter varying between 5·6 and 9·25 lb. per cow and per week. The latter high result was obtained when feeding with a high quality oaten chaff and bran. As a rule, such high increases are by no means permanent, and after a few weeks the average normal yield will again be reached by a gradual falling off. A change from dry feed to green feed nearly always produces an increase in the amount of fat, also feeding with oil cakes may produce a temporary rise, and a liberal judicious hand-feeding will always keep up the yield and prolong the period of milking.

(h) **Influence of Mating Period and Health Generally.**—During the mating period the yield of milk, due to the sexual excitement, is generally seriously diminished, just as the general state of health always has a great influence on the yield. At the beginning of any sickness frequently an enormous increase in the percentage of fat, due to a correspondingly decreased flow of milk, may be observed.

(i) **Influence of Season.**—The state of the weather has a marked effect on the milk flow, and a change from warm to bleak cold weather will always cause a considerable falling off if no provision is made to protect cows by stabling and rugging. Excessive heat is also detrimental, and shady shelters should be erected, if no natural shelter exists.

As milk is one of our most important staple foods, it is only natural that nearly in all countries **standards** with regard to the quality of milk sold to the public have been fixed, which protect the buyer so far that he is sure to get a milk containing at least a certain amount of butter fat and total solids, and is free from injurious preservatives. Our local **Health Act** requires the milk to contain at least **3·0 per cent. of butter fat and 8·5 per cent. solids not fat.** If we compare these values with the average composition of cow's milk, we will see that this standard is very low, and is a minimum standard of quality; and that the milk of our town supply should contain an amount of fat nearer to 3·5 and even 4 per cent.

It is not only necessary that the composition of the milk does not fall below certain limits, but it is of equal importance that the milk is *free from injurious germs* which, milk being such a complete food, find it an excellent medium for rapid development. The health of the public, and particularly of the children, can only be safeguarded by a strict *Government control over the milk supply*, and such a control must not be satisfied to get the milk periodically analysed chemically and bacteriologically, but must carry out an inspection of dairies,

stables, milking-sheds, water supply, the dairy herds, and even of the persons doing the milking. The mortality of children during their first year of life is nearly in all cities very high, and this is largely due to the milk supply, and by a strict control over the supply the death rate may be considerably reduced. At Copenhagen the death rate of children under one year, which amounted to 20·8 per cent. between 1877 and 1886, was gradually reduced to 19·0 per cent. between 1887 and 1896, 17·9 per cent. between 1897 and 1899, and was only 15·6 per cent. during 1900.

Serious epidemics—as typhoid, cholera, scarlet fever, diphtheria—have been known to have been spread by the use of contaminated milk.

Fresh milk, when kept standing, is liable to undergo certain changes, under the influence of micro-organisms, which, as already stated, develop with enormous rapidity, more particularly at our higher average temperature during summer. The addition of chemical compounds, as **antiseptics**, to make the milk keep, can for health reasons not be countenanced, and the only safe method for the **preservation** of milk is **pasteurisation** and **sterilisation**, which have the object to kill the micro-organisms.

Sterilisation means a heating of milk for some time to a temperature of 230 degrees to 240 degrees Fahr., which is best effected by heating with steam under pressure. At that temperature all germs are killed, and milk so treated can be kept for any length of time in a hermetically sealed vessel. This treatment of the milk has, however, an influence on the taste, composition, and digestibility of the milk, and for this reason a heating to a lower temperature of only 175 to 185 degrees Fahr., called *Pasteurisation*, is often employed. This heating kills only the bacteria but not the spores of such organisms, and, in order to make the process as effectual as sterilisation, the heating has to be repeated several times. All heating of the milk should be followed by cooling, and the milk should be kept at a temperature under 50 degrees Fahr. to retard the development of spores.

Cream.—When milk is allowed to stand in shallow vessels, the fat globules, which are lighter than the milk serum, will rise to the surface and form a layer of cream. This separation may be accelerated by rotating the milk very rapidly, as under the influence of the centrifugal force the light fat globules rise very much quicker, and at the same time the separation is more complete and leaves a **skim milk** containing only traces of butter fat.

The composition of the cream depends entirely on the manner in which the separator is worked, and cream may contain from 20 to 60 per cent. of butter fat. The keeping quality of the cream again will depend largely on its richness, and a cream containing only 15 to 20 per cent. of fat contains still a very large amount of milk serum, with its casein and milk sugar, which soon gives rise to fermentation, bad flavours, and various taints. The ripening of a richer cream will proceed more uniformly and favourably, the churning of such cream will give better results and produce a high-grade butter, the cream tests are easier checked; for these and several other reasons this State has fixed a standard that the cream supplied to factories should not contain less than 35 per cent. of butter fat.

Butter.—By a mechanical process of stirring, shaking, or “*churning*,” the butter fat of milk and cream may be collected in a solid mass as butter. The fat globules, by being continuously knocked against each other, will adhere and collect into larger irregular granules, which eventually separate from the **butter milk**. The process of churning and the quality of the butter produced depend on a great many circumstances, as temperature, quality, and ripeness of cream, &c. During the finishing of the butter, which consists principally in a working or kneading of the butter and washing to get rid of most of the butter milk, a certain amount of salt is usually added. Butter contains a certain amount of water, which should not exceed 15 per cent.—our export butters average about 12 per cent. of moisture—and a small amount of curd and salt.

Cheese is the product obtained from milk by coagulating the casein, and separating the curd, which also encloses the largest amount of the fat, from the whey which contains the milk sugar, soluble proteins, and salts in solution. The coagulation of the milk is generally caused by the addition of rennet to the slightly warmed milk. The curd is finely divided, salted, and pressed; and the finished cheese allowed to ripen slowly under the influence of certain enzymes and micro-organisms. Cheese will contain more or less butter fat in accordance with being manufactured from whole milk, or skim milk, or mixture of the two.

The changes which are brought about by the ripening are very complicated: water is given off by slow evaporation, the milk sugar is changed into lactic acids, the casein is changed into more digestible proteins, and other numerous organic compounds are formed which give the cheese the peculiar flavour.

Condensed milk is a milk in which a considerable portion of the water has been evaporated. The evaporation is usually carried out at a low temperature in vacuum pans, and either with or without the addition of cane sugar.

The evaporation of milk may be carried so far as to obtain the milk in the form of a dry powder.

QUESTIONS TO THE TWENTY-FIRST LESSON.

1. What are the principal constituents of milk?
 2. Which fatty acids are found in butter fat?
 3. In what form does butter fat exist in milk?
 4. What nitrogenous compounds are found in milk?
 5. What is the difference between the curd precipitated by rennet and by acids?
 6. What chemical elements constitute casein?
 7. Which are the characteristic properties which distinguish casein and milk albumen.
 8. What are the properties of milk sugar?
 9. Which of the constituents of milk may show the greatest variations, and which again are always almost constant?
 10. What influences cause variations in the quantity and quality of milk?
 11. Which animal's milk resembles human milk in its composition?
 12. What is the usual minimum standard of the composition of milk?
 13. In which manner can milk be contaminated and become unfit as a food?
 14. What are sterilisation and pasteurisation?
 15. Why is a cream of 35 per cent. of fat fixed as a standard?
 16. What changes take place in the ripening of cheese?
-

THE BRISBANE PRODUCE MARKETS.

The accompanying two illustrations show the busy scene on market days at the Roma-street and at the Tank-street Co-operative Produce Markets. The scene here on market days reminds one very much of the old Paddy's Market in Melbourne, fifty years ago. The whole floor space is occupied by piles of produce of every description. On all sides the auctioneers are rapidly putting up and knocking down tons of fruit, such as pineapples, citrus fruits, melons, mangoes, grapes, &c., and, in addition, piles of vegetables. The scene at the railway trucks is very animated. At Roma street the trucks run right through the sheds, and truck loads of lucerne hay, pumpkins, maize, onions, wheat, chaff, &c., are speedily disposed off or reserved for higher prices. Outside the markets long lines of vehicles of all descriptions are drawn up awaiting the purchases of their owners. On Friday mornings, the principal market day, the markets are well worth a visit, if only to note the eager bidding for specially good lines of fruit, vegetables, and general farm produce.

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

STATIONS.	1906.	1907.											
	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
<i>North.</i>													
Bowen	11·01	2·53	3·74	1·97	0·39	3·46	2·87	Nil	1·28	0·51	0·06	3·71	6·39
Cairns	11·31	18·36	11·49	3·26	3·35	8·65	4·45	0·12	0·39	1·35	0·68	5·35	28·33
Geraldton	21·20	29·58	25·26	4·58	6·08	21·91	8·54	2·39	4·66	1·36	1·42	6·45	33·82
Herberton	10·82	10·56	11·77	2·05	0·90	1·57	2·71	Nil	0·11	0·12	0·17	3·41	9·57
Hughenden	4·76	1·98	3·83	1·17	0·16	1·34	0·95	1·16	Nil	Nil	1·66	0·66	7·75
Kamerunga State Nurs.	8·17	15·78	14·82	4·87	2·80	9·33	5·29	0·13	1·15	1·19	0·53	2·76	29·82
Longreach	0·51	1·22	0·49	1·88	0·85	0·93	0·40	0·49	0·04	Nil	1·08	2·83	9·12
Lucinda	*22·36	12·38	23·82	4·53	3·92	19·29	6·34	0·29	1·05	1·19	0·25	0·43	23·38
Mackay	12·93	2·72	6·42	8·01	1·58	*6·09	5·04	0·27	0·25	0·12	0·12	5·76	9·70
Rockhampton	5·19	4·15	4·42	3·05	0·44	0·94	4·16	0·84	0·47	Nil	0·47	3·72	4·42
Townsville	11·03	12·49	7·75	7·37	1·03	3·11	2·38	Nil	0·07	0·14	0·03	2·82	24·26
<i>South.</i>													
Barcaldine	1·04	3·44	0·43	1·51	0·82	0·34	2·03	0·87	0·06	Nil	1·21	1·54	11·74
Beenleigh	3·98	4·75	3·88	4·17	0·58	4·70	4·92	0·71	0·58	Nil	1·73	2·81	4·48
Biggenden State Farm	4·55	5·77	3·55	10·91	0·34	4·02	5·24	1·51	0·96	0·24	1·99	2·50	5·55
Blackall	1·96	2·30	Nil	2·78	1·69	0·20	0·36	1·36	0·06	Nil	0·88	0·80	7·47
Brisbane	3·28	2·69	5·23	5·32	0·45	4·75	2·91	0·39	0·79	0·10	1·37	4·25	3·21
Bundaberg	3·85	3·29	3·90	12·81	0·38	3·08	4·49	0·87	0·43	Nil	1·70	2·90	2·99
Caboolture	3·15	2·53	8·03	9·04	0·78	3·10	4·98	0·73	0·32	0·13	2·09	3·75	3·18
Charleville	3·71	0·85	Nil	2·75	2·29	0·26	0·90	1·04	0·76	0·02	1·69	3·88	4·09
Dalby	5·67	5·60	1·34	3·72	0·20	2·26	2·35	0·87	0·71	0·15	0·69	5·18	1·44
Emerald	1·79	7·36	3·67	7·66	Nil	Nil	2·53	1·75	0·10	Nil	0·98	1·84	6·70
Esk	5·26	2·87	6·79	3·60	0·22	5·42	2·66	0·54	0·81	0·57	0·50	3·76	3·72
Gatton Agric. College	3·45	2·62	6·44	2·71	Nil	2·80	1·85	0·54	0·56	0·15	0·71	3·01	4·55
Gayndah	2·82	3·00	1·91	6·89	Nil	2·65	3·00	1·21	0·53	0·40	0·34	4·65	6·84
Gindie State Farm ...	1·45	6·13	0·71	10·10	Nil	Nil	2·29	1·58	0·10	0·16	0·61	1·57	4·42
Goondiwindi	4·04	5·37	1·77	6·51	0·33	1·30	1·09	1·62	0·95	0·12	1·13	2·91	3·71
Gympie	5·32	3·99	6·96	8·93	1·12	3·84	3·77	0·80	0·17	0·47	1·20	3·05	5·49
Ipswich	4·22	2·17	5·38	1·95	0·12	3·43	2·22	0·30	0·43	0·05	0·78	4·45	3·40
Laidley	4·12	2·84	4·50	3·47	Nil	2·99	1·56	0·45	0·58	0·15	0·87	1·97	2·72
Maryborough	4·39	5·52	7·84	10·28	1·25	3·21	6·05	0·64	0·93	0·25	2·74	3·49	5·81
Nambour	6·74	5·74	12·05	13·30	1·36	4·54	6·96	1·08	1·13	0·60	1·38	2·98	4·76
Nerang	6·33	9·86	6·04	7·83	1·48	7·54	5·08	1·26	1·35	0·05	0·86	3·88	4·51
Roma	4·31	6·32	2·92	1·87	0·42	0·27	2·47	1·03	0·42	0·04	1·04	3·70	2·51
Stanthorpe	4·89	4·33	3·30	5·98	1·68	1·79	2·44	1·06	1·65	0·13	1·30	5·03	3·46
Tambo	1·16	4·74	1·41	3·58	3·69	0·11	0·89	1·42	0·09	Nil	0·68	2·03	7·20
Taroom	5·49	5·16	1·10	1·86	Nil	1·01	3·76	0·70	0·04	0·10	0·67	6·82	3·79
Tewantin	9·53	6·38	15·83	11·45	1·87	7·16	7·61	1·48	0·95	0·55	1·05	3·12	7·36
Texas	1·83	4·69	4·55	6·16	0·65	0·93	1·62	1·31	0·87	0·07	1·83	2·78	2·15
Toowoomba	4·11	3·94	4·00	4·81	0·01	4·61	3·34	0·91	0·65	0·17	1·58	5·12	2·81
Warwick	5·50	3·95	2·52	5·71	0·51	1·58	1·27	1·16	1·37	0·01	1·37	3·25	3·13
Westbrook	1·48	1·79	2·91	5·13	0·02	2·53	2·53	1·04	1·78	Nil	1·08	4·76	3·23

* Compiled from telegraphic reports.

GEORGE G. BOND,
Divisional Officer.

Answers to Correspondents.

A HOME-MADE TARPAULIN.

HAY-GROWER, Helidon.—

A perfectly rain-proof tarpaulin may be made in the following simple manner:—When your canvas is put together, take 2 parts of Stockholm (not coal) tar and 1 part of neatsfoot oil. Do not use linseed oil, or you will harden the canvas. Heat the oil by itself to boiling point. Then add the tar, and stir well. Apply with a wad of oakum or soft rag. A brush is not so good. Rub the mixture well in. It will take some time to dry, but the tarpaulin will be soft, limp, and rain-proof.

SEPARATED MILK FOR HAND-FED CALVES.

HY. BROWN, Gympie.—

When skim milk is fed to calves, there is something wanting in it, and that something is the butter taken out of the whole milk in the shape of cream. It follows, therefore, that this loss must be made up by some supplementary feed. Mixing raw bran or chopped oats with the milk inflicts injury upon the calf by scouring. At from one to three weeks old most calves will eat a mixture of chopped oats, ground linseed, and bran in a dry state. The chewing necessary fits the feed for proper digestion, and prevents all risk of scouring, such as occurs when skim milk is gulped down hurriedly from the feeding pail. It has been conclusively shown that this risk can be avoided by mixing 2 oz. of cod liver oil with each 3 gallons of milk. Calves so fed will never scour, but gain as much as 1'38 lb. in weight daily.

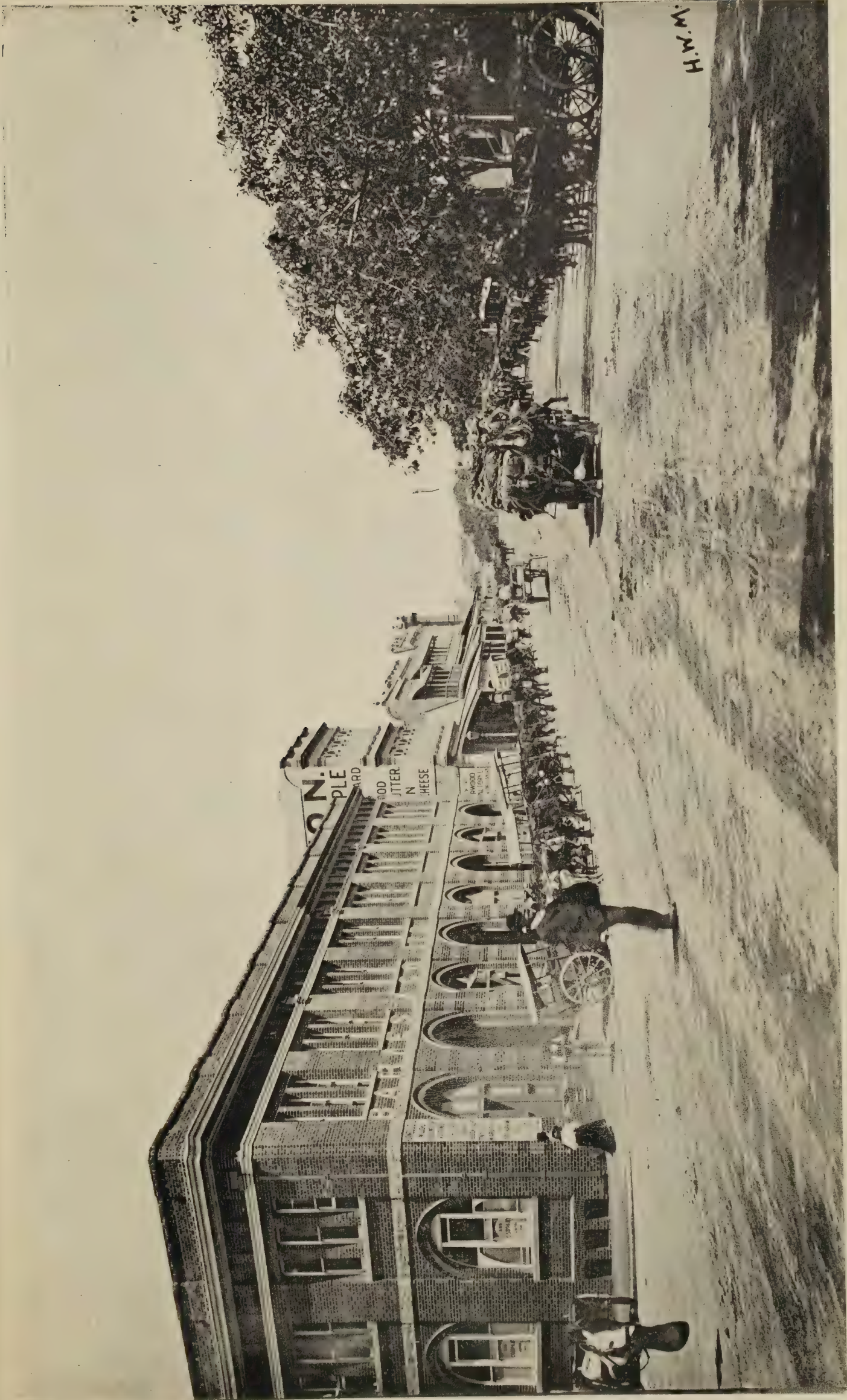
The Markets.

PRICES FOR FRUIT—ROMA-STREET MARKETS.

Article.						JANUARY.
						Prices.
Apples, Imported, per packer ...	...	...	...	...	...	18s. 6d.
Apples, New England, per packer ...	...	...	...	...	...	4s. to 10s.
Apples, Tasmanian, Cooking ...	...	...	...	...	...	...
Apricots, Local, per packer ...	...	...	...	...	...	...
Bananas, Local, per bunch ...	...	...	...	...	...	6d. to 2s.
Bananas, per dozen ...	...	...	...	...	...	2d. to 2½d.
Cherries, per quarter-case ...	...	...	...	...	...	...
Custard Apples, per quarter-case ...	...	...	...	...	...	6s. to 7s.
Grapes, per lb. ...	...	...	...	...	...	1d. to 5d.
Lemons, per case ...	...	...	...	...	...	2s. to 6s.
Lemons, Rough, per case ...	...	...	...	...	...	1s. 3d. to 2s.
Mangoes, per case ...	...	...	...	...	...	...
Nectarines, per quarter-case ...	...	...	...	...	...	3s. to 6s.
Oranges, Imported, per case ...	...	...	...	...	...	22s. 6d.
Passion Fruit, per quarter-case ...	...	...	...	...	...	...
Pears, per quarter-case ...	...	...	...	...	...	10s. to 12s.
Peaches, per quarter-case ...	...	...	...	...	...	3s. to 5s.
Peanuts, per lb. ...	...	...	...	...	...	...
Persimmons, per case ...	...	...	...	...	...	...
Pineapples (rough leaf), per dozen ...	...	...	...	...	...	6d. to 1s. 6d.
Pineapples (smooth leaf), per dozen ...	...	...	...	...	...	1s. 6d. to 3s. 6d.
Pineapples, Ripley's ...	...	...	...	...	...	1s. to 3s.
Plums, quarter-case ...	...	...	...	...	...	...
Quinces, per case ...	...	...	...	...	...	...
Rockmelons, per dozen ...	...	...	...	...	...	1s. to 5s.
Rosellas, per bag ...	...	...	...	...	...	...
Strawberries, per tray ...	...	...	...	...	...	...
Tomatoes, per quarter-case ...	...	...	...	...	...	6d. to 2s.
Watermelons, per dozen ...	...	...	...	...	...	2s. to 6s.

SOUTHERN FRUIT MARKET.

Apples, Tasmanian, per case ...	...	...	...	...	...	...
„ American, per case ...	...	...	...	...	...	...
Apricots, per quarter-case ...	...	...	...	...	...	...
Bananas, Fiji, per case ...	...	...	...	...	...	13s. 6d. to 14s.
„ „ per bunch ...	...	...	...	...	...	5s. to 7s. 6d.
„ Queensland, per bunch ...	...	...	...	...	...	4s. to 5s.
„ „ per case ...	...	...	...	...	...	12s. to 13s.
Cherries, per quarter-case ...	...	...	...	...	...	...
Gooseberries, Tasmanian, per quarter-case ...	...	...	...	...	...	...
Lemons, Ordinary, per gin case ...	...	...	...	...	...	...
Mangoes, Queensland, per case ...	...	...	...	...	...	5s. to 6s.
Mandarins, Queensland, in Melbourne, per case ...	...	...	...	...	...	...
Oranges, Queensland, per case ...	...	...	...	...	...	14s.
Oranges, Common, per case ...	...	...	...	...	...	...
Oranges, American Navel, per case ...	...	...	...	...	...	16s. to 18s.
Pears, Victorian Vicars, per box ...	...	...	...	...	...	...
Passion Fruit, per quarter-case ...	...	...	...	...	...	4s.
Peaches, per case ...	...	...	...	...	...	...
Pineapples, Queensland Queen's ...	...	...	...	...	...	5s. to 7s.
Pineapples, Choice (Common) ...	...	...	...	...	...	5s. to 6s.
Pineapples, Medium ...	...	...	...	...	...	3s. to 5s.
Peanuts, per quarter-case ...	...	...	...	...	...	11d. to 1s.
Rockmelons, per double case ...	...	...	...	...	...	5s. to 6s.
Tomatoes, per quarter-case ...	...	...	...	...	...	3s. to 5s.
Watermelons, Queensland, per dozen ...	...	...	...	...	...	8s. to 10s.



DEALERS' CARTS AT THE BRISBANE PRODUCE MARKETS, ROMA STREET.

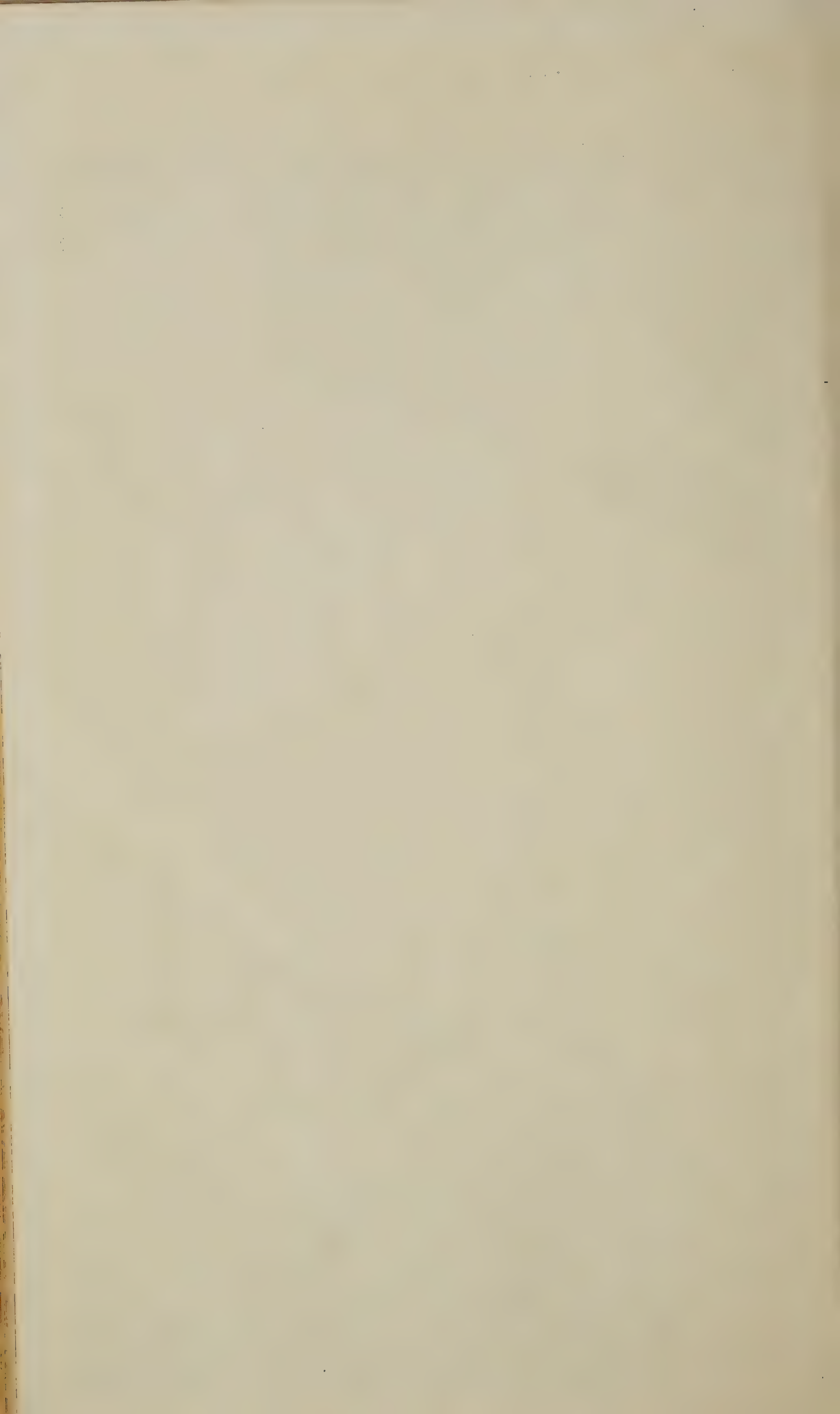
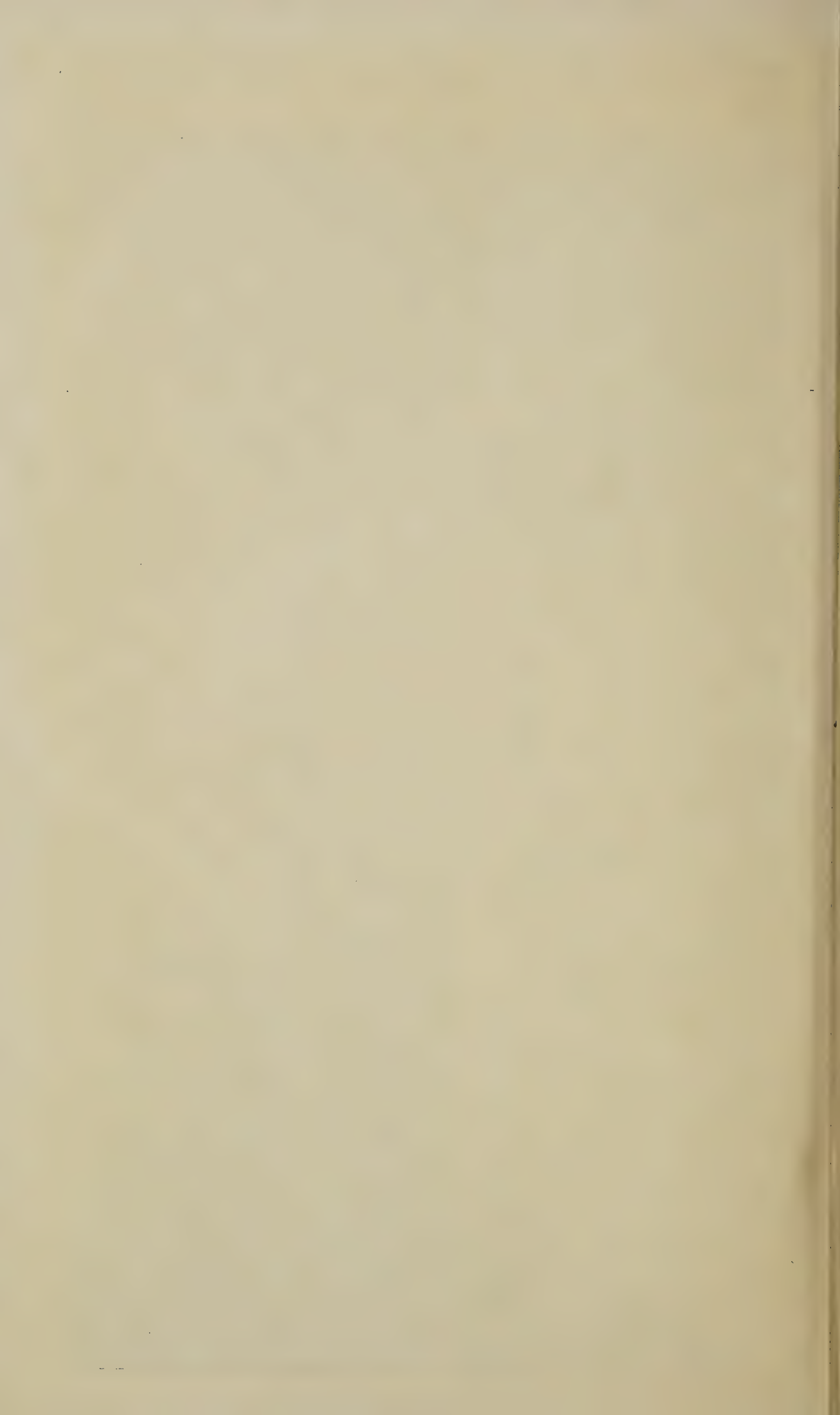


Plate X.



THE BRISBANE CO-OPERATIVE PRODUCE MARKETS, TURBOT STREET.



PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR
JANUARY.

Article.								JANUARY.	
								Prices.	
Bacon, Pineapple...	...	...	...	...	...	...	lb.	8½d. to 10d.	
Bran	...	...	...	...	...	...	ton	£5 5s. to £5 10s.	
Butter, Factory	...	...	...	...	...	...	lb.	10½d.	
Chaff, Mixed	...	...	...	...	...	...	ton	£6 to £6 10s.	
Chaff, Oaten	...	...	...	...	...	...	"	£6 10s. to £6 15s.	
Chaff, Lucerne	...	...	...	...	...	...	"	£4 to £5.	
Chaff, Wheaten	...	...	...	...	...	...	"	£4 10s. to £5 10s.	
Cheese	...	...	...	...	...	...	lb.	6½d. to 8½d.	
Flour	...	...	...	...	...	...	ton	£12.	
Hay, Oaten	...	...	...	...	...	...	"	£7 10s. to £8.	
Hay, Lucerne	...	...	...	...	...	...	"	£2 10s. to £3 10s.	
Honey	...	...	...	...	...	...	lb.	2d. to 2½d.	
Maize	...	...	...	...	...	...	bush.	3s. 10d. to 4s. 7d.	
Oats	...	...	...	...	...	...	"	3s. to 4s.	
Pollard	...	...	...	...	...	...	ton	£6 to £6 10s.	
Potatoes	...	...	...	...	...	...	"	£6 to £9.	
Potatoes, Sweet	...	...	...	...	...	...	"	...	
Pumpkins	...	...	...	...	...	...	"	...	
Wheat, Milling	...	...	...	...	...	...	bush.	5s. to 5s. 2d.	
Wheat, Chick	...	...	...	...	...	...	"	5s. to 5s. 6d.	
Onions	...	...	...	...	...	...	ton	£8 15s. to £9.	
Hams	...	...	...	...	...	...	lb.	1s. 1d.	
Eggs	...	...	...	...	...	...	doz.	7½d. to 8d.	
Fowls	...	...	...	...	...	...	pair	1s. 10d. to 3s. 6d.	
Geese	...	...	...	...	...	...	"	6s. 6d. to 7s. 6d.	
Ducks, English	...	...	...	...	...	...	"	2s. 6d. to 3s.	
Ducks, Muscovy	...	...	...	...	...	...	"	3s. 9d. to 5s.	
Turkeys (Hens)	...	...	...	...	...	...	"	7s. to 8s. 6d.	
Turkeys (Gobblers)	...	...	...	...	...	...	"	10s. to 18s.	

ENOGGERA SALEYARDS.

Animal.								DECEMBER.	
								Prices.	
Bullocks	...	...	...	...	...	...	...	£10 5s. to £11 15s.	
„ (Extra Prime)	...	...	...	...	...	...	...	£12 7s. 6d. to £14 12s. 6d.	
Cows	...	...	...	...	...	...	...	£8 15s. to £10 15s.	
Merino Wethers (Woolly)	...	...	...	...	...	...	...	22s. 9d.	
C.B.	...	...	...	...	...	...	...	23s.	
Merino Ewes	...	...	...	...	...	...	...	18s. 9d.	
C.B.	...	...	...	...	...	...	...	15s. 9d.	
Shropshire Ewes (Very Good)	...	...	...	...	...	...	...	26s. 6d.	
Lambs	...	...	...	...	...	...	...	17s.	
Pigs (Porkers)	...	...	...	...	...	...	...	27s. 6d.	

Farm and Garden Notes for March.

FIELD.—Take every opportunity of turning up the ground in readiness for sowing and planting winter crops. The main crop of potatoes should at once be planted. As the growth of weeds will now be slackening off, lucerne may be sown on deeply-cultivated soil. The latter should be rich and friable, with a porous subsoil. The land should be thoroughly pulverised. Do not waste time and money in trying to grow lucerne on land with a stiff, clay subsoil. Prepare the land a couple of months before sowing, care being taken to cross-plough and harrow before the weeds have gone to seed. This ensures a clean field. Sow either broadcast or in drills. In the former case, 20 lb. of seed will be required—in the latter, 10 lb. A good stand of lucerne has been obtained with less quantities. Lucerne seed is worth from £2 16s. to £3 5s. per cwt. Should weeds make their appearance before the plants have sent down their tap roots, mow the field. Before they can again make headway enough to do any damage, the lucerne will be strong enough to hold its own against them. Harrow and roll the land after mowing. Gather all ripe corn. It is now too late to sow maize, even 90-day, with any certainty of harvesting a crop of grain. Rye grass, prairie grass, oats, barley (in some districts, wheat), sorghum, vetches, carrots, mangolds, and swede turnips may be sown. In Northern Queensland, sow tobacco seed, cowpea, Carob beans, sweet potatoes, opium poppy, &c. Sow Anatto, Jack fruit, and plant Kola nut cuttings. Some temperate zone vegetables may be planted, such as egg plant, potatoes, &c. Coffee-planting may be continued. Harvest kafir corn and paddy.

FLOWER GARDEN.—Now is the time to plant out bulbs. A complete garden could be furnished with these charming plants, which are to be had in every colour and variety. Amongst the many are:—*Amaryllis*, *anemone*, *arum*, *babiana*, *crinum*, *crocus*, *freesia*, *ranunculus*, *jonquils*, *iris*, *ixias*, *gladiolus*, *narcissus*, *Jacobean lilies*, *tigridia*, *tritonias*.

All bulbs like well-drained, somewhat sandy soil, with a plentiful admixture of leaf mould. Herbaceous plants and annuals which it is intended to raise from seed should be sown this month. Such are:—*Antirrhinums* (Snapdragon), *asters*, *cornflowers*, *dianthus*, *larkspur*, *daisies*, *cosmia*, *candytuft*, *lupins*, *gaillardias*, *godetia*, *mignonette*, *poppies*, *pansies*, *phlox*, *sweet peas*. Cannas now planted will require plenty of food in the shape of liquid manure. Put in cuttings of *carnations*. *Chrysanthemums* require attention in the way of disbudding, staking, watering with liquid manure, &c. Growers for exhibition will thin out to a few buds and protect the flowers from rain and sun. *Dahlias* should be looking well. To secure fine blooms, disbudding should be done.

Now, as to climbers which may now be planted. These are:—*Allamanda Schottii* (beautiful yellow); *Antigonon leptotus*, a charming cerise-coloured climber; *Aristolochia elegans*, handsome as an orchid and easily grown; *Aristolochia ornithocephala* (Dutchman's Pipe), very curious, large, always attracts attention; *Asparagus plumosa*, grows in any shady place; *Baumontia grandiflora*, splendid white flower, grand for a fence, will grow 50 feet high; *Bignonias* of several kinds; *Bougainvilleas*, with their splendid leafy, pink and purple flowers, rapidly clothe a fence or unsightly shed with a blaze of blossom; *Quisqualis indica*, a fine creeper, flowers pink, changing to white; *Wistaria*, purple and white. Most beautiful is the *Bauhinia scandens*, rarely seen about Brisbane. We grew a plant of this climber at Nundah, and it soon closed in the front of the veranda for a distance of over 80 feet. The leaves are very small, and in the flowering season it presents almost a solid mass of beautiful round bunches of blossom, something like the hawthorn bloom—pink and white. It

seeds freely, but the seeds are difficult to germinate, and when they have produced a plant it is still more difficult to rear it. A rooted sucker from the main stem will in all probability grow.

KITCHEN GARDEN.—During this month a very large variety of vegetable seeds may be sown in readiness for planting out where necessary in the autumn, which begins on the 20th of March. All unoccupied land should be roughly dug, and, where required, add well-decomposed manure. Transplant cabbage, cauliflower, celery, &c. Sow French beans, beet, carrot, turnips, radish, cabbage, cauliflower, cress, peas, mustard, &c. Former sowings should be thinned out and kept clear of weeds. Mulch round melon and cucumber beds with a good dressing of long stable manure, as it assists in keeping the fruit clean and free from damp. Cucumbers, melons, French beans, and tomatoes should be looked for every day and gathered, whether required or not, for, if left on the vines to perfect their seeds, the plants will soon cease to be productive, or will form inferior, ill-shaped, and hence unsaleable fruit.

Orchard Notes for March.

By ALBERT H. BENSON, M.R.A.C.

THE SOUTHERN COAST DISTRICTS.

The marketing of the main crop of pineapples will continue to occupy the attention of growers, and, as it is probable that the plantations have been allowed to get somewhat dirty during the previous month, they should be cleaned up as soon as ever the crop has been got off. The first of the new crop of citrus fruit will be showing signs of ripening towards the end of the month, and, as the fruit during this period of its growth is very liable to the attack of insect pests of various kinds, it is important that steps be taken to prevent loss arising from this cause as far as possible.

Large sucking moths of several kinds attack the fruit as soon as it shows signs of ripening, and, as they always select the first fruit that shows signs of colouring, it is a good plan to gather a few forward fruit, and to ripen them up quickly by placing them on a barn floor and covering them up with bags or straw. They will turn colour in a few days, and develop the characteristic scent of the ripening fruit. The fruit so treated should be hung up in conspicuous places in the orchard as trap fruit, as not only will it attract the moths, but also fruit flies. The moths will be found clustered round the trap fruits in large numbers, and can then be easily caught and destroyed. Fruit fly will also puncture such fruit, and, if the fruit is destroyed before the larvæ reaches maturity, a later crop of these insects is prevented from hatching out. Fruit flies may also be caught in large numbers by means of such artificially-ripened fruits. The fruits are smeared with tanglefoot and hung about the orchard. The fly, attracted by the colour, settles on the fruit, and is caught in a similar manner to house flies on specially prepared sticky paper. These simple remedies, if carefully carried out, will result in the destruction of large numbers of sucking moths and fruit flies.

The yellow peach moth, that does such damage to peaches in spring, and that attacks corn, sorghum, cotton bolls, custard apples, and many other plants and fruits, often does a lot of damage to citrus fruits. It acts in a very similar manner to the second and later generations of the Codling moth of pomaceous fruits, in that it lays its eggs where two fruits touch, under the shelter of a

leaf on the fruit, at the stem end of the fruit, and, in the case of navel oranges, in the navel itself; in fact, anywhere that there is a likelihood of the egg not being disturbed. The egg hatches out into a small spotted caterpillar, which eats its way into the fruit, causing it to ripen prematurely and fall off. Where two fruits touch, it often eats into both and destroys both; and it frequently leaves one fruit to go and destroy a second. It is a very difficult insect to deal with, owing to the number of fruits and plants on which it lives, but, as far as citrus fruits are concerned, the best remedy is undoubtedly to spray the fruit with a remedy that will destroy the young insect when it starts to eat the skin of the fruit. Bordeaux mixture has been found efficacious, but I am of opinion that spraying with Paris green and lime, Kedzie's mixture, or arsenite of lead will also have good results. The latter poison is, in my opinion, well worth giving a thorough test, as it sticks to the fruit and leaves for a long time. Bordeaux mixture, either alone or in conjunction with Paris green or Kedzie's mixture, is, however, a good remedy, as not only will it destroy the larvæ or prevent the moth from attacking the tree, but it is also the best remedy for black brand or melanose, as well as tending to keep all other fungus pests in check. Fight fruit fly systematically, both by means of the sticky fruit already recommended, and by gathering all fly-infested fruit, such as guavas, late mangoes, kumquats, &c., as well as any oranges or mandarins that may have been infested, as if kept in check now there will be little less throughout the season. A little fruit will be marketed towards the end of the month. See that it is gathered and sweated for seven days before marketing, and don't gather it too immature. Beauty of Glen Retreat mandarins are often gathered and marketed as soon as they show signs of colouring. They are then as sour as a lemon, and anyone who is unlucky enough to buy them will sheer off mandarins for some time to come. This variety should not be gathered till thoroughly ripe, as when marketed in an immature state it spoils the market, as it puts people off eating citrus fruit. Clean up the orchard after the summer rains, and have everything ready for the marketing of the crop. See that there is a good supply of clean, dry case timber on hand, as one of the greatest sources of loss in shipment is packing fruit in green cases.

Strawberry planting can be done throughout the month. Plant such berries as Federation on the lowest ground, and Aurie, Anetta, Trollop's Victoria, Glenfield Beauty, on warm well-drained soils. Prepare the land thoroughly, so that it is in perfect tilth, and in a fit state to retain moisture well, as in this, as much as anything, the success of the crop depends. When new orchards are to be planted, get the land ready; not the clearing, which should have been done months ago, but the working of the land, as it is advisable to get it thoroughly sweetened before putting the trees in.

TROPICAL COAST DISTRICTS.

The Notes for February apply equally to March. See that bananas are netted. Keep down weed growth, and market any sound citrus fruits. Clean up the orchards as well as possible, and keep pines clean. Get land ready where new orchards are to be set out, as tree-planting can be done during April and May. Pines and bananas can still be planted, as they will become well established before winter.

SOUTHERN AND CENTRAL TABLELANDS.

Finish the gathering of the later varieties of deciduous fruits, as well as grapes. Clean up the orchard, and get ready for winter. Get new land ready for planting; and when there are old, dead, or useless trees to be removed, dig them out and leave the ground to sweeten, so that when a new tree is planted to replace them the ground will be in good order.

In the drier parts, where citrus trees are grown, keep the land well worked, and water when necessary.

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It is hereby notified that the *Journal* will be supplied to all members of Agricultural and Horticultural Societies who do not derive their livelihood solely from the land, on payment, in advance, of an annual subscription of 5s., which will include postage. Schools of Arts will be supplied at the same rate.

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Agriculture.

No. 5.—MARKET GARDENING.

By A. J. BOYD.

SALSAFY AND SCORZONERA.

Salsafy is very generally known as the "Oyster Plant." The roots are boiled like carrots or parsnips, or half boiled and grated fine; then made into small fat balls, dipped into batter, and fried like oysters, which they much resemble in flavour.

The cultivation is the same as for carrots. The seed is sown in drills, from 8 to 12 inches apart, 2 inches deep, and, when the young plants are up, thin them out to 3 or 4 inches apart in the row.

Use them as required until the roots begin to grow, when they should be taken up and stored like carrots and parsnips.

The seed may be sown from March to August, and the plant comes to maturity in 150 days.

Scorzonera or "Black Salsafy" is cultivated in the same manner. Both are grown exclusively for the roots, which may be boiled and served plain like parsnips. Before cooking, the outer coarse rind should be scraped off, and the roots soaked in cold water for a few hours to extract their bitter flavour.

OKRA.

Okra, sometimes called Okra Gumbo, is of easy culture, and grows freely, bearing abundantly in any ordinarily good garden soil.

This vegetable is rarely grown in Queensland, but in the East and West Indies it is used in all households for soups and stews. The pods are used before the seeds become ripe and dry, whilst still green and tender. The plants should be from 2 to 2½ feet apart each way. Keep down the weeds, and loosen the soil among them occasionally.

Sow in September and up to the end of November.

The pods may be cut into slices and dried for winter use.

CHOKOS.

The Mexican name for this vegetable is "Chayote." In the West Indies it is called "Chocho," which is the nearest approach to the Queensland corruption, "Choko." It is a climbing vine, producing an immense quantity of light-green foliage, and is of very vigorous growth. It is one of the most prolific bearers amongst the *Cucurbitaceæ*, from which family it differs in that it has only one seed. It is very easily propagated by planting the whole fruit. When the seed has germinated, a plumule or sprout emerges from between the cotyledons, and this sprout will continue green for a very long period, even when lying unburied. The plant thrives in a remarkable degree on our rich scrub soils, notably on the Blackall Range, where the fruit is grown in large quantities for feeding dairy cattle, pigs, and horses. There the chokos are pitted by the farmers. In the pits they sprout very soon, but remain perfectly fresh and good for a long time. A prodigious number of fruits are gathered from a single vine, as many as 400 having been gathered in the season. No disease of any kind has been known to attack the plant in Queensland.

The fruit has a recognised place as a table vegetable in this State. It is cooked in the same manner as cucumbers and vegetable marrows.

Plant the whole fruit in August or September, and train the vines over a strong trellis, over a fence, or over outhouses. The fruit will be ready for use in 60 days.

YAMS.

The cultivation of yams is only carried on to any extent in Northern Queensland, and there only to supply the kanaka labourers with their favourite island diet. Now that the kanakas have been deported to their island homes, the area under yams is considerably curtailed, as the white population in this State has never taken to this tuber as a regular article of diet, as in the case of the sweet potato.

The yam requires a rich sandy loam, deep and friable, for the rich tubers will not be able to develop properly in stiff heavy soils. It will grow within a wide zone, extending 30 degrees north and south of the Equator. Most of the yams are propagated in the following way:—

When the tubers are ready to be dug up, the tops are cut off with the vines attached, and care is taken not to disturb the plant more than is necessary. The top is then again buried in the ground, and it and the base of the vine are moulded up with good soil and left undisturbed for about three months, when another yam, called the "head," will be found to have been produced. Plants are then made by cutting the head into pieces, care being taken that each cutting possesses an eye or bud, from which the new plant develops. The land is usually lined out in rows 3 feet apart, the plants being set at distances of 3 feet in the rows. September is the best planting season, and the tubers take from 150 to 250 days to mature. The plants require an occasional moulding up.

PEANUTS.

Peanuts, or, as they are called, earth and ground nuts, do best in a rich sandy loam. In August make hills about 3 feet apart, and, having shelled the seeds, drop three or four in each hill, covering them to a depth of 2 inches. A fair average crop is 2,000 lb. of nuts per acre, but a crop of 4,000 lb. is not at all uncommon. The cost of cultivation is comparatively trifling.

The peanut requires, as stated, a fairly rich sandy loam, and the land should be cultivated as for potatoes, although shallower ploughing is needed—say, from 4 to 5 inches. The object of this shallow ploughing is to secure a firm bed on which the nuts may rest. If the ploughing is too deep, the roots run down to some depth, the nuts take longer to ripen, are more difficult to harvest, and are subject to many dangers. When the soil is reduced to a good tilth, the land should be marked off in rows 4 feet apart, and cross-rows should be drawn, about 2 feet apart, and the nuts planted as described above in the case of hills. In about a fortnight the young plants will be up. If any misses occur, they should now be filled up, and then the ground must be kept clean until the running vines render hoe work needless. The plant is remarkable for its habit of burying its seed pods in the ground to ripen. The varieties which do this are more difficult to harvest than those which have not this peculiarity.

The planting season may be extended in Queensland from August to November.

Harvesting.—When the vines have quite died off, either naturally or after a frost, harvesting should begin.

The tops, or haulms, are cut off with a reaping-hook, and may be used as fodder for cattle and horses, which are very fond of it. The stems to which the nuts are attached may be drawn out by hand where only a small area is grown, and the bunches laid down near the row. Next day they are laid on a straw platform, and a fortnight later the nuts are stripped off. Where large areas are planted, a much cheaper way of unearthing the nuts is to run the plough under the roots, turning up the nuts still adhering to the stems. They are then dealt with as above.

The nuts must now be thoroughly dried during several days. If not properly dried, they turn dark, and lose 50 per cent. of their value. The colour is of great importance. The hulls should be bright and clean; hence the

nuts grown on light sandy soil will bring a higher price than those grown on black soil.

A bushel of nuts will weigh 22 lb., and an ordinary corn sack will hold 90 lb. The minimum price of good nuts is 2d. per lb., or £18 per ton for good, ripe, dry, bright-coloured nuts.

From 12,000 to 19,000 nuts, according to distance apart and the number of nuts planted per hill, will be required per acre.

The nuts take six months to ripen.

Although peanuts are usually grown as a field crop, I have included them among the ordinary market-garden crops, because small quantities can generally be sold in the markets at about 2½d. per lb.

The best variety for eating purposes is the North American Red; for oil production, the Carolina.

HORSE RADISH.

In European countries, and especially in England, no dish of roast beef would be considered perfect unless garnished with scraped horse radish or with the adjunct of horse-radish sauce. In this State probably not one in a hundred of our beef consumers know what kind of a vegetable it is, or, if they know the name, they are ignorant of the uses to which it is put.

A deep, loose; strong soil, with plenty of moisture, is considered the most suitable for the growth of horse radish. In the autumn the soil is forked over to the depth of 2 or 2½ feet, and well-rotted farmyard manure is thoroughly worked in to the depth of 1 foot or more. A narrow bed, 3 feet wide, is then prepared, and late in August or early in September the horse-radish cuttings are planted along both edges, alternating so that they are not opposite to each other across the bed. The cuttings are 12 inches long, and are set out 18 inches apart. Instead of being placed vertically in the ground, they are planted in a slanting position, with the upper and larger end covered by only an inch of earth, while the lower lies 3 inches or 4 inches deep.

As a consequence of this slanting position, the new roots thrown out from the lower end of the cutting strike vertically downwards, making nearly a right angle with the main stem, and it is from these slender roots that the new cuttings for the next season's planting are made. During the summer the ground is kept free from weeds, and the surface of the ground is slightly stirred. Towards the end of November the bed is gone over carefully, and each cutting uncovered separately and slightly raised out of the ground with the hand. Care is taken not to injure the perpendicular roots which have formed from the lower ends. All small rootlets are rubbed off from the body of the root with a woollen cloth, those that are too large to be removed in this manner being cut close with a sharp knife. A small quantity of powdered charcoal is scattered over the cut surfaces to prevent decay, and the cutting is again covered with earth as before. In order to keep the new roots of a uniform diameter, and to prevent their striking deep into the soil and becoming too slender, the beds are sometimes underlaid with a porous cement pavement, 1½ foot below the surface of the ground. This pavement checks the growth of the young roots and causes them to thicken.

The roots are allowed to continue their growth till the end of February, when the harvest begins. The cuttings which have been two seasons in the ground—first as vertical roots and afterwards in the slanting position—are by this time large enough for market. In digging the horse radish a long-bladed mattock or spade is used. This enables the digger to remove not only the obliquely-planted cutting, which is the marketable product, but also the new roots from its lower end, of which the cuttings for the next crop are to be made. The average thickness of good marketable horse radish is 2½ inches at the large end and 1½ inch at the other.

Horse radish may be kept quite fresh for several months by planting the roots in a cool cellar in moist sand, and the cuttings held over for the spring planting may be kept in the same way.

MUSHROOMS.

Mushrooms grow profusely in many parts of Queensland, and are eagerly sought after in the neighbourhood of cities and towns. Dairy farms and horse paddocks are the most prolific localities for these excellent vegetables. Growing mushrooms in the open is one of the simplest forms of gardening. All that has to be done is to prepare a bed, "spawn" it, and the mushrooms will appear in due season—namely, in the autumn. But mushrooms really grow all the year round, and may be gathered in quantities in the spring season; hence beds should be prepared in time to admit of a crop appearing at the most suitable time. The spawn is obtained from the parent plant, and much resembles a cobweb. This is preserved in bricks made of a mixture of turf and manure, and will last a long time in this condition.

Preparing the Bed.—During January or February a quantity of horse-droppings should be collected. They must not be piled up in a heap, but rather be spread out thinly under a shed until required. Dig trenches 1 foot deep and about 4 feet wide, and into the trenches throw the droppings to a depth of 9 inches. Then ram or tread them down firmly to exclude the air as much as possible, thus preventing the droppings from heating too much. Now, break up the spawn bricks into pieces of the size of a small marble, and set them a foot apart, almost on the surface of the manure. If no rain should come, give the beds a fair sprinkling of water, and a few days afterwards cover the manure and spawn with 3 inches of fine soil. In Queensland we often have heavy rains in February, and too much water is injurious to the spawn, so it would be well to provide some shelter for the beds. If the weather is suitable, within a month or six weeks after covering up the spawn with earth, tiny white buttons spring up at intervals all over the bed, the spawn being distributed in spaces of about 1 foot apart. These little buttons rapidly develop into mushrooms, and in about three weeks they are large enough to cut for the market.

One of the strangest things about mushrooms is that they can be produced spontaneously, as it were, from a bed of manure and earth properly prepared and cared for. Without spawn or seed of any kind, if the work is properly done, after a few weeks the mushrooms will spring up from a bed of this kind, and for about three weeks they can be gathered; but that exhausts the bed, and you will never get another mushroom from it unless spawn is introduced.

Cellar Cultivation.—Wherever there is a cellar or dark recess beneath the house, excellent mushrooms may be produced in large quantities. The first requisite is equable temperature; the next, dampness; and the third, gloom. The best way to prepare the cellar is to build shelves all round the walls and in the centre; indeed, anywhere, so long as room is allowed to pass between the shelves. On these shelves, boxes a foot deep are placed. They may be of any suitable width and length, but they must have the depth. As soon as the boxes are in position, the next thing is to prepare the beds for the reception of the spawn. I have already shown how to prepare the bed in the open, and the same method will serve for the cellar bed, the spawn being put in a little further apart than was the case in the garden, the reason being that we shall have a larger crop on a given area, owing to the superior conditions of temperature and damp; 16 inches is not too great a distance between the fragments of spawn. The temperature must be kept at from 60 to 70 degrees Fahr., and such a temperature is easily maintained in a cellar, even in our hottest months. Next comes the question of dampness. This is essential. But it is not always necessary to water the beds. The plan adopted in Paris cellars is to water the floor and also to sprinkle the walls. The same is done in America.

When the mushrooms are being gathered, they should not be picked by hand. This often results in the top breaking away from the stem, and thus the market value is lessened. They should be snipped off about half an inch below the head. A long stick with a sharp brad in the end is used to harpoon each button or formed mushroom.

Mushroom-growing is a very profitable business. The spawn can be purchased from Queensland seedsmen in small quantities for 1s. per 1-lb. brick; but intending growers can produce the spawn artificially in this way:—

Mix two or three kinds of dung—horse and sheep, or horse, sheep, and cow dung—and heap up under cover, treading it down as the heap grows. Then cover the lot with fermenting horse dung or with bags. In a month or six weeks, if the compost heap has not been over-heated, you will find on taking out a handful of it that there are small white threads running through the dung. This is the mushroom nucleus. It will not keep, however, and should be used at once. In a stable which had not been cleaned out for some time, I have found the white mushroom fibres on breaking a piece of the hard trampled dung. Seeing, then, that mushrooms can so easily be raised in any odd, dark, damp shed, and that there is always a ready sale for them in the cities, the market gardener cannot do better than devote a short time each day to caring for them.

HERBS.

No market garden is complete without herbs. These are generally easy to raise from seed. If plants can be obtained, so much the better. They may be sown at any time between April and August. Each particular variety should have a small bed, about 3 feet wide, to itself.

Where plants are not obtainable, sow the seed in rows drawn a foot apart, just deep enough to cover the seed. When the plants are up, thin them out to a foot apart. See that they are well watered during the summer; keep the surface of the soil loose, and mulch. In autumn or in early spring take them up and divide the roots, planting them at 18 inches apart. Continue making new plantings every winter, as these will take the places of those which may die out during the hot summer.

The most useful are—Fennel, marjoram, mint, parsley, sage, thyme, and rosemary.

Fennel is propagated from seed or by division of the roots.

Marjoram.—Sow in light soil and thin out, or in boxes. It grows and spreads rapidly.

Mint.—This herb is propagated by division of the roots. It will grow in any fair garden soil, and spread so rapidly as to become in a very short time a nuisance. The roots run a long distance underground, and send up shoots at every joint.

Parsley.—This most useful herb may be sown two or three times a year, but preferably in February or March and in August. Sow thinly in drills 10 or 12 inches apart. When the plants are strong, cut them down to induce strong curled foliage. If not regularly cut, parsley will go to seed in one season.

Sage.—Like other shrubby herbs, sage may be grown from seed, by division of the roots, and by cuttings.

Thyme and rosemary are propagated in the same manner.

DRYING HERBS.

In order to ensure a constant supply of culinary herbs, independently of the weather, recourse may be had to drying them. Gather the herbs on a dry day as the flowers are beginning to open. Look them over carefully, and remove dead leaves and any foreign matter. Tie in little bundles; hang these up in a dark dry place where a draught can get at them. When quite dry, rub off the leaves and sift and clean out all dust and twigs; then place the leaves in wide-mouthed bottles and seal airtight. Do not on any account dry herbs by sun or fire heat. If they are treated as here directed, they will keep their flavour indefinitely.

INSECT PESTS AND DISEASES OF CULINARY CROPS, AND THEIR REMEDIES.

It must not be supposed, after all has been done as suggested in the foregoing pages, there will be nothing to prevent all the crops growing luxuriantly right through the season. So far from that, the market gardener will have to contend with many kinds of pests and diseases. Caterpillars, slugs, fly, locusts, birds, worms, scale insects, and fungoid diseases of various sorts will all attack your garden in turn, and these must be destroyed as soon as they appear, or there will be very little, if any, profit.

What is the best way of fighting them all?

In a small garden you may do a great deal by picking off the caterpillars, but the slugs (particularly the voracious *Vaginula*) are night intruders, and must be dealt with in a different manner.

Whilst recommending the following remedies for the various diseases and pests affecting vegetables, I at the same time recommend gardeners to study the writings of scientific vegetable gardeners, and make use of the remedies suggested by them. By so doing you will find that you will be successful with your garden; and, if you have also a farm to attend to, you will have plenty of time to grow field crops as well.

The *Vaginula* Slug.—To effectually destroy this nocturnal visitor, the use of "tobacco waste" may especially be recommended. This is composed of the discarded mid-rib of the tobacco leaf, after it has been cured. It is worth about 5s. per load at the tobacco factory.

Tobacco dust is also a certain destroyer of the slugs. To apply the waste or dust, scatter either on the soil round the plants or beds to be protected. When the slugs come in contact with it, they secrete a thin film of mucus from their feet as if to protect them from injury, but the tobacco waste is fatal to them. You may also make a decoction of tobacco from the waste in this way:—Fill a barrel with the stems, and cover with water, and boil it down to the strength required. If you want a very strong solution, fill the barrel with fresh stems, and fill up with the water already used.

Aphis and Cabbage Moths.—Spray with 2 fluid ounces of black-leaf tobacco to 1 gallon of water. Spraying with the resin and soda wash is also very satisfactory. The wash is prepared as follows:—Resin (pounded), 5 lb.; caustic soda (70 per cent.), 1 lb. (or washing soda, 3 lb.); fish oil, 1 pint. Water to make 25 gallons. Boil the above ingredients with water enough to cover for one or two hours, adding water slowly if there is a tendency to boil over. The compound will assume the colour of black coffee. Occasionally pour a small quantity of the mixture into water. If it is not boiled sufficiently, it will form a ropy mass at the bottom of the vessel. Dilute with warm water, stirring all the time, to one-third. This first bulk of 8 gallons makes a stock mixture to be diluted to the full amount when used. A very fine spray must be used.

Turnips are especially liable to the attacks of aphides, which, if not checked, spread with alarming rapidity, and will soon exterminate a whole field. Spraying with the resin and soda wash, with kerosene emulsion, or with tobacco water, on first noticing the pest, will usually effectually get rid of it.

Kerosene Emulsion.—Kerosene, 2 gallons; soap, $\frac{1}{2}$ lb.

Spraying with Paris green will effectually destroy the larvæ which riddle the leaves of cabbages, cauliflowers, &c., but it must be borne in mind that Paris green, being an arsenical poison, must not be used on crops of this kind within five or six weeks of their being ready for market. The danger from insect pests will be considerably lessened if the location of these crops be altered every season.

If Paris green is dusted from a bag in the proportion of 1 oz. to 100 oz. of flour, and just enough applied to make a slight show on the leaves—say, 1 oz. of the mixture to twenty-eight heads of cabbage—the aphis or worms will all be killed in the course of two or three days, while the average amount

of poison on each cabbage will be about one-seventh of a grain. Fully one-half of the powder will fall on the outside leaves and on the ground, and thus an individual would have to eat about twenty-eight cabbages in order to consume a poisonous dose of arsenic, even if the balance of the poison remained after cooking.

Thrips.—Much damage is sometimes done to an onion crop by a fly of the order *Thysanoptera*, known as Thrips. These are very small insects, scarcely large enough to be seen by the naked eye. Like the aphides, scale insects, and plant bugs, they draw away the juices of the onion by means of their sucking apparatus. Dusting with lime or soot is said to be useful in destroying them, but deep ploughing appears to have the best effect.

Wire Worms.—No time must be lost in encountering this enemy. They require to be trapped in the following manner:—Cut up some carrots, beets, or sweet potatoes into wedge-shaped pieces, and stick them into the ground all over the beds to be protected. When these are taken up on the following day, it will be found that the worms have eaten their way into them. The traps should be lifted with a trowel, because many of the pests will be found in the soil around them. The only crop which the wire worm has an objection to is mustard; if, therefore, a crop of mustard be planted on land infested by the worm it will perish from starvation.

Scale Insects.—Resin compound is known to be very effective against scale insects. One of the best formulæ is—Caustic soda, 1 lb.; resin, 5 lb.; water, 25 gallons. Two ounces of Paris green may be added to this when used.

All insects, injurious or beneficial, have many natural enemies of their own to contend with. Amongst these, some which attack noxious insect pests from the outside, and either devour them or suck their vital juices, are called predaceous insects—*e.g.*, ladybirds, spiders, soldier bug, black ground beetle, &c. There are others which are called parasitic insects, which live inside the bodies of their victims, and ultimately kill them. Among these, the most numerous are the ichneumon wasps.

Birds.—There are some birds which are very destructive in the vegetable garden, but a much larger number are purely insect-eaters, and as such are of very great assistance to the gardener. I need here only instance the sparrow as an example of a seed-eater and a confirmed lover of young lettuce; and the dollar-bird as the friend of the gardener. Sparrows may be destroyed by poisoning them with wheat soaked in strychnine, vinegar, and sugar. A Belgian horticulturist claims to have discovered a sure and inexpensive way of preventing the depredations of seed-eating birds. It is to shake up some powdered minium with the seeds just before sowing. Red minium is a poisonous salt of lead, but is not dangerous to handle. Either its taste or smell prevents the seeds being touched by any insect or bird. Crystals of naphthaline are said to give equally good results.

Tomato Disease.—Tomato diseases have become very common of late years, and it, therefore, behoves every market gardener to be able to recognise the early symptoms of various troubles, so that remedies may be applied before the diseases have obtained a strong foothold. We will first consider the condition of the plant known as "Tomato Wilt."

This disease is a bacterial blight. The attacked plants wilt suddenly, and, after a time, leaves and stalks become discoloured and die. The disease is mostly spread by inoculation caused by the bites of insects. The organism causing the trouble is believed to be present in the soil, from which it spreads to the plants. Sour ground aggravates the evil.

The first step to take is to spray with a poisonous mixture and destroy those insects which move from plant to plant, thus spreading the disease. One ounce of Paris green in 10 gallons of Bordeaux mixture will effect this. Carefully dig round the diseased plants and prevent the spread of the web-like

fungus which extends its meshes from plant to plant underground, boring directly into the healthy cortical cell, and thus giving an entrance to the bacteria.

Root Knot.—This, as its name implies, is a disease of the root, caused by the eelworm, which forms galls or irregularly-swollen diseased growths on the roots, resulting in the wilting and death of the plants, which should be dug up and burned, and the soil sterilised with quicklime.

Tomato Blight.—In this case the fungus-infested foliage shows rusty, yellowish spots, and the edges of the leaves often curl downwards before the foliage shrivels and dies, leaving the stem bare. Spraying with Bordeaux mixture directly the first indications of disease are observed, and the removal of badly-affected plants, are effective remedial measures.

Tomato Rot.—This is caused by a fungus, which generally only attacks half-grown fruits, the first symptoms being the appearance of a small black spot at the blossom end, rapidly increasing in size until half the affected fruit is sunken, black, and destroyed, the injury usually extending uniformly from side to side across the tomato.

The crop also suffers from a kind of tomato dropsy, visible in swellings on both leaves and stems, and in the curling of the former. This disease results from an excessive quantity of water in the tissues of the plant, and is encouraged by insufficient light and by injudicious watering, especially in dull weather.

Bordeaux Mixture.—Sulphate of copper (bluestone), 4 lb.; quicklime (to be freely slaked), 4 lb.; water, 22 gallons. Dissolve the bluestone in 10 gallons of water by placing it in a sack suspended in the water and moving the sack about, when the sulphate will quickly dissolve. Make a whitewash with the lime, strain to separate the grit, and bring the milk of lime to 10 gallons. Mix these up to 22 gallons. Use only wooden or earthenware vessels. When the foliage is out, use the half-strength mixture by diluting in double the quantity of water. To determine if the mixture is safe to use on tender foliage, insert a new nail or the blade of a penknife for at least half a minute; if copper is deposited on the steel, lime must be added.

Celery Leaf Blight.—Spray at intervals of eight days, commencing when the foliage is quite young, with an ammoniacal solution of copper carbonate. This solution should be prepared by mixing 1 oz. of carbonate of copper with 5 oz. of carbonate of ammonia in about a quart of hot water. When thoroughly dissolved, 16 gallons of cold water should be added. If thoroughly done, two or three sprayings should suffice to suppress the disease. All diseased leaves should be burnt.

The Pumpkin Beetle (The Banded Galernea).—This is one that not only attacks the leaves of the pumpkin, but is also partial to the foliage and tender organs (especially the flowers) of vegetable marrows, cucumbers, and melons. It is an orange-coloured beetle, of an oblong form, measuring about a quarter of an inch in length, and rendered conspicuous by the presence of two black bands crossing the wing-covers, the posterior of which bands is interrupted in the middle. Although popularly styled a ladybird, it is not a member of that (the *Coccinellidæ*) family of beetles. It may, therefore, be most appropriately termed "The Banded Galernea," to distinguish it from the plain-coloured Galernea, a beetle of analogous habits, and having the same host-plants. [From notes on the beetle, kindly supplied to me by Mr. Hy. Tryon, Entomologist and Vegetable Pathologist, Department of Agriculture.]

Mr. Tryon suggests two methods of coping with the pest—"Repellents" and "Destroyers." The Banded Galernea, although endowed with a voracious appetite, usually declines to consume foliage which has become soiled. Accordingly, the plants may be more or less protected by dusting them all over with fine wood ashes and air-slaked lime or plaster of Paris, and especially if these substances have had a few drops of carbolic acid or kerosene previously added to them.

For destroying the insects, Paris green or London purple, in a dry state as diluted powder or as forming an ingredient in a liquid, may be dusted or sprayed over the plants.

When the plants are still very young, hand-picking may be resorted to with good effect, and subsequent soundness of the plants secured, as it is commonly those left to themselves that form a starting point for a second generation of insects of greatly augmented numerical strength, and thus give rise to the serious damage to the crop, and subsequent loss to the gardener, so commonly made a matter of complaint.

I may add that during October and November last I saved from fifty to sixty cucumber and vegetable marrow vines by hand-picking alone, and the fruit came to perfection. Over 100 of the beetles were caught every morning, and the same number in the evening, on each day during those months.

CONCLUSION.

Garden vegetables do not exhaust the soils on which they are grown to any extent as compared with the exhaustion produced by many field crops. Peas and beans are the most exhausting crops.

The chief ingredient in a good fertiliser for vegetables of which the leaves and stems are the edible portions is nitrogen. For root vegetables, phosphoric acid and potash are about as important as nitrogen. For vegetables of which the seed is the edible portion, especially such as are planted early, like the garden pea, phosphoric acid is the leading element. For vegetables like the tomato, egg plant, celery, melon, &c., potash is the most important.

Nitrogen forces early growth, and gives large, succulent leaves and stems. Potash gives solidity and crispness to stems and leaves, and high colour to the fruit. Phosphoric acid gives plumpness, and increases the sugar and starchy parts of the seed, and forces early maturity. A good general fertiliser for all garden vegetables, except beans and peas, would be the following mixture per acre, but intensive market gardeners use two or three times as much:—Sulphate of potash, 150 lb. to 225 lb.; superphosphate, 250 lb. to 375 lb.; nitrate of soda, 150 lb. to 225 lb. The fertiliser should be raked in just before the seed is sown. For peas and beans the normal amount of potash and phosphoric acid may be doubled, and the nitrate of soda reduced to 50 lb. per acre. The sulphate is the best available form of potash for garden vegetables, as it contains no chlorides of salt, and does not make the soil cold. It also acts with especial favourableness on the starchy portion of vegetables. Fresh or water-slaked lime is always beneficial to garden soil.

HOW TO TEST THE VITALITY OF GARDEN SEEDS.

The vitality of seeds diminishes rapidly with age, and it is, therefore, well to determine their vitality before sowing. A cheap and convenient way of doing so is the following:—Take two earthenware plates of the same size; cut out two circular layers of flannel, somewhat smaller than the plates. Between the two layers of flannel place 100 seeds of the variety to be tested. Moisten the flannel with all the water it will absorb. The two layers of flannel are placed in one plate and covered with the other, and set in a warm place. If the flannel is thin, several pieces should be used, in order to absorb sufficient water. Other kinds of absorbent cloth or blotting-paper can be used, but thick flannel is more satisfactory. Damp sand may also be used as a seed bed with success. The dishes should be kept in a room which is warm at night. Keep the flannel constantly moist. Some seeds will commence to germinate by the third day. Examine the seeds each day, and remove and record those which have germinated. Two weeks will suffice for the test. The results obtained may be considered as representing the per cent. of vitality under favourable conditions. The per cent. germinating in the ground is likely to be less. Grass seeds require as much as three weeks, and seeds of some trees a still longer time. Beet balls contain from three to seven seeds.

With very small seeds it may be necessary to provide for the circulation of the air by placing small pieces of wood between the layers of cloth among the seeds. With most varieties of garden plants the majority of seeds should germinate within a few days after the first sprout appears. If the period of germination extends over a longer period, it shows that the vitality of the seed is low. Seeds of the carrot family and some melon seeds may not show as high results in the germinating dishes as they do in the ground.

Below I give a list of common seeds, with the average number of years that they will retain their vitality:—Bean, 3; beet, 6; cabbage, 5; carrot, 5; celery, 8; cucumber, 10; maize, 2; lettuce, 5; rock melon, 5; onion, 2; parsnip, 2; pea, 2; pumpkin, 4; radish, 5; squash, 6; tomato, 4; turnip, 5; water melon, 6. [Taken from Professor Bailey's Horticulturists' Rule Book.]

This is what Weather's "Garden Plants" says about mulching, and vegetable growers, as well as horticulturists generally, will do well to "read, mark, learn, and inwardly digest" what is set down here. During all the dry weather which was experienced in Queensland from August to November, 1907, the writer of these notes grew excellent lettuce, French beans, tomatoes, and other vegetables, as well as dahlias, carnations, dianthus, and many garden flowers, mainly by the help of mulch. If you cannot thoroughly soak your land in a dry season, it is better to water very little and trust to mulch.

What is mulch?

A "mulch," or "mulching" in gardening language, means an extra covering of soil, rotten leaves, or manure, either separately or combined, placed over the roots of plants, either after the latter have been newly planted or at any period during their growth when it may be considered advisable.

The advantages of mulching may be summed up as follows:—

- (a) During the hot and dry summer months it prevents excessive evaporation from the soil, and thus not only preserves the moisture for the roots to absorb, but it also prevents the soil from becoming excessively hot by day and cold by night, thus maintaining a more regular temperature.
- (b) In winter it protects the roots from frost, and also keeps the soil warmer.
- (c) When a rich mulch is applied to newly planted trees and shrubs, it not only has the above advantages, but the manurial matters contained in it are washed down into the soil, and enrich it with food for the benefit of the newly formed or forming roots.
- (d) A good mulching of rich manure to all plants which have begun to develop fruit and seeds is highly beneficial in assisting them to swell rapidly and ripen more quickly. They make a demand upon reserve materials, and, if these are not quite sufficient to meet the demand, it is easy to conceive that the extra food supplied by means of a good mulching will supply the deficiency.

ROTATION.*

Plants belonging to the same natural order should not be allowed to succeed each other. Some crops are a good preparation for others, as, for instance, onions after celery.

Rotation assists in checking the devastations of insects and fungi to which a crop may be subject. Deep-rooted crops enrich the top soil for the benefit of shallow-rooted varieties which may follow.

Different crops require plant foods in varying proportions; hence a rotation is more economical of manure.

A definite system of rotation affords better opportunities for cleaning the ground.

* For the above I am indebted to "The Horticultural Note Book," compiled by J. C. Newshan, F.R.H.S., head master and manager of the Hampshire County Council Agricultural and Horticultural School.

Crops which occupy the ground for several years should be succeeded by others of shorter duration.

Rotations allow of a better distribution of labour during the year. Plants cultivated for their roots or bulbs should not be succeeded by others grown for a like purpose.

Rotations may extend from three to eight years, according to the size of the garden, the quality of the soil, the products required, the manures available, &c.

EXAMPLES OF VEGETABLES WHICH MAY PRECEDE OR SUCCEED IN ROTATION.

Vegetable under Cultivation.	Preceding Crop.	Succeeding Crop.
Beans ...	Cabbages, brocoli, parsnips, carrots, potatoes	Cabbage tribe, leeks, turnips.
Beet ..	Cabbage tribe, leeks, onions, celery, potatoes	Cabbages, cauliflowers, peas, beans.
Borecole ...	Peas, beans, lettuce, potatoes ...	Carrots, beet, parsnips, onions, celery.
Brocoli ...	Peas, broad beans, kidney beans ...	Late sowings of carrots, turnips, &c.
Cabbages ...	Peas, beans, onions, potatoes ...	Celery, onions, beet, carrots, potatoes.
Carrots ...	Onions, cabbage, leeks, celery, potatoes	Cabbage, onions, peas, beans.
Celery ...	Potatoes, cabbage, any early crops ...	Peas, beans, onions, leeks, potatoes.
Leeks ...	Potatoes, cabbage, beans, peas ...	Peas, beans, carrots, parsnips, potatoes.
Onions ...	Potatoes, cabbage tribe, beans, peas, celery	Cabbage tribe, peas, beans, potatoes.
Potatoes ...	Cabbage tribe, beans, peas, onions, leeks	Peas, beans, cabbage tribe, celery,

Brussels sprouts require the same rotation as borecole.

Cauliflowers " " cabbages.

Kidney beans " " peas.

Parsnips " " carrots.

Peas " " beans.

Turnips " " carrots.

JOHNSTONE GRASS HAY.

Whilst admitting that Johnstone grass is an excellent fodder plant, we should advise and always have advised farmers not to have anything to do with it on cultivated land. It spreads rapidly, and is exceedingly difficult to eradicate. That view is shared by many Queensland farmers who have planted it. However, there are two sides to every question, and below we give the opinion of "The Florida Agriculturist," yet it will be noted that that journal remarks:—"The only objection to it has been that, once in the soil, it is almost impossible to get rid of it." If, says the "F.A.," you have some land which you are willing to devote to a permanent meadow, you might try Johnstone grass. The only objection to it has been that once in the soil it is almost impossible to get rid of it. It has proved to be very profitable as a grass for making hay, as is shown by the following from the "Rural New Yorker":—Johnstone grass is pretty well scattered over eastern Mississippi, and it is in most sections the main dependence for dry forage. It is a very nutritious grass, and is full of saccharine matter, hence stock are very fond of it, as they are of all plants containing sugary matter. It is more of a hay grass than pasture grass.

On some soils much pasturing will of itself exterminate it; this is true of sandy, light soils. On heavier and more waxy soils, the grass seemingly disappears after a certain period of pasture. The land may remain in pasture for years and not a sprig of the grass be discernable, but when the ground is ploughed and an effort made to grow a crop the grass springs up over the land and grows off luxuriantly. By planting the land immediately after the plough, working the crop rapidly and well, good corn crops are frequently made. Ploughing the land loosens up the under soil and breaks up the mass of cane-like roots of this grass, and the result is a luxuriant growth of grass and a

heavy yield of hay. In fact, ploughing the Johnstone grass meadow at least every two years is essential to secure maximum yields of this grass. On good lands, under fairly favourable conditions, three heavy crops of hay in one season is not unusual. On such land 3 and 4 tons of hay per acre is not above the average. The quality of the hay depends largely upon the stage of mowing; if the grass reaches too mature an age, you get more bulk, but at the sacrifice of quality. This is the case with nearly all hay grasses.

As soon as the hay is ready to bale, it can be readily sold at from 7 dollars to 10 dollars per ton f.o.b. Those who are not posted, or who are in need of money, usually sell in the fall and early winter. Those who know conditions better, and are not so pressed for money, hold the hay until spring, and get a much better price for it. The spring prices are always better. Last fall most of the hay crop in this part of the State was sold, and the price obtained was around 8 dollars per ton on cars. All who held on till winter was over received 14 dollars and 15 dollars. One man here, who works in a bank, who has a partner in the hay business, informed me the other day that they received a cheque for 230 dollars, the proceeds of one single car of hay. That sounds good for the hay business. He stated further that they sold a good deal of hay last fall at 8 dollars per ton, not any better quality than this last. Nearly all the hay that is raised in this section is from lands valued at from 5 dollars to 15 dollars per acre; lands that could not be sold for more money at this time. These lands under proper treatment have a productive capacity of from 3 to 4 tons of marketable hay per annum. Let us figure on 3 tons per acre at 8 dollars. Here we have a gross income of, say, 24 dollars per acre at the minimum price or 45 dollars at the maximum price. With the best of labour-saving hay tools and implements, supplemented with good management, there is certain to be good money in the hay business.

Johnstone grass is by far the most popular grass for hay with feeders throughout this and adjoining States. There is always a ready market for the hay at good prices. It will sell where Bermuda will not; it will sell where even alfalfa will not. Johnstone grass hay is well known; alfalfa is not. It has taken long years to introduce and build up a reputation for Johnstone grass hay. For a long time handlers of hay in our cities, and their patrons, were ignorant of the value of this grass as a hay, and were prejudiced against it. Horsemen would buy nothing but Northern Timothy. Not so now. The day was, and not very long ago, when buyers preferred the coarse, wiry prairie grass of the West to any distinctive Southern hay grass. Of course, that was ignorance, and gross ignorance. They had to be educated out of their ignorance and prejudices.

In connection with the above, the following from an Alabama paper shows how profitable Johnstone grass hay can be made:—

A man in Shelby county bought a little farm of 120 acres, which was a mat of Johnstone grass, not much fencing, some chimneys where the house had been, but fairly good outhouses. He got it for 450 dollars. That was a few years ago. The place is in good shape to-day, with a neat house and good fences, and not a dollar has been spent on it that was not made out of the place. The owner lives on it, and would not take 2,500 dollars for it. Much of the ready money comes from Johnstone grass and cattle. The man does not want a Government pamphlet telling him to kill Johnstone grass. It brings him 250 dollars to 350 dollars in cash every year.

SHEEP FOR THE FARM.

The following hints on selecting breeding ewes for the farm are given by an experienced New Zealand sheep farmer. He says:—"Not only does it pay to keep a few sheep to clean the land of weeds and vegetation that other stock do not eat, but they are directly profitable, inasmuch as the returns from wool

and lambs are no small item in the farm receipts. The mutton type of sheep, carrying a fair fleece of wool, is more profitable than the sheep producing wool chiefly and a carcass of relatively little value. The very best skill and experience are needed in selecting the breeding ewes. They had to deal with the relative merits of the different breeds or their crosses, their general hardiness, fertility, ability to nurse, early maturing, and fattening. The popular ewe in New Zealand is either the half-bred Leicester-merino or Lincoln-merino; either of these is prolific, a good mother, and gives a valuable fleece of wool. The cross-breeding gives vitality and hardiness to the ewe. Farmers who have merinos raise objections to the crossbreds. 'Fence creeping' is referred to, but as the farmers of late years have used wire netting very extensively and the ordinary sheep fences are much better and more substantial most of this trouble is avoided. Then the crossbred is preferable to the ordinary merino, as the latter part of the spring often sets in dry and the grass soon withers; consequently the value of the early maturing lambs, which are ready about a month sooner than the merino, cannot be over estimated. Further, the percentage of lambs from the crossbred ewes can easily be estimated at a considerable increase on the merino. Injury from grass and blindness with wool are less frequent, and the blow-fly is not so troublesome as on the merino ewes.

"Again, when it is advisable to feed down a cereal crop, the crossbred ewe will eat the rank growth more readily than the merino, which picks at the tender shoots and leaves the more forward plant alone. Equally as important, if not more so, is the selection of rams. One of the poorest places to economise is in the purchase of the sire, whether in cattle, horses, or sheep. The improvement of any flock from year to year is measured by the superiority of the rams. Many of the culled rams that are offered for public sale are not fit to be put with the ewes; thin necks, weak shoulders, and hollow britch are defects which will show in the progeny, and which must be avoided in the purchasing of rams. It will pay to purchase Lincoln or Leicester rams and mate them with their best plain-bodied, large-framed ewes. The ewe lambs of this cross should be kept to form the breeding flock for the export lambs, while the wethers make ideal mutton, and always command a good price in the market."

THE JACKSON POTATO DIGGER.

The following is the article referred to in our last issue concerning the new potato digger, manufactured and invented by Mr. Jackson, of Taringa:—
"A few weeks ago the late Home Secretary, the Honourable F. D. Denham, and Major Boyd, of the Agricultural Department, journeyed, at the invitation of Mr. Jackson, of Taringa, to Kenmore to witness a trial of the potato digger lately invented and perfected by that gentleman. A large number of neighbouring farmers attended the trial, which was conducted on Mr. Squire's farm. The machine, which is simplicity itself, was drawn by two horses. After a preliminary trial to regulate the depth of the coulter, Mr. Burnett set it to work in earnest, and it performed the work to the satisfaction of all the practical farmers present. The rows were two and a quarter chains long, and the average time taken to turn out every potato in the row was one minute. As soon as the machine was set to the proper depth, every potato was unearthed, and busy forks failed to find any left in the ground. At the conclusion of the trial, Mr. Denham mounted the machine, and turned up a row in good workmanlike style. Mr. Denham's row was turned out in just half a minute, and a sack of potatoes was the result.

We omit the last paragraph of the article for obvious reasons. Mr. Denham was at that time canvassing the Oxley electorate.

Dairying.

DAIRYING INDUSTRY.

COMPREHENSIVE REPORT—*continued*.

By G. SUTHERLAND THOMSON, Government Dairy Expert.

OBJECTIONS TO GRADING CRITICISED.

Exception has been taken to the grading of butter in Queensland, particularly the marking of grades on the boxes. With a view to a modification of the Dairy Act in its application to grading and inspection of cream, pressure was brought to bear on the Department by representatives of proprietary and co-operative companies.

The chief reasons that members of recent deputations against grading used in support of their demands were as follows:—(a) Butter improves in cool storage; (b) it is impossible to tell in Brisbane what the quality of butter will be when it reaches London; (c) butter that was stamped No. 1 has turned out in London a No. 2, and *vice versa*; (d) climatic conditions differing in the State and different food for milking stock ruin all possibilities of grading accurately; (e) London merchants purchase Queensland butter under the trier and not according to official grade; (f) the superfine stamp is not a guide to the quality of butter; (g) prices of second-grade butter are frequently only a little lower than first grade; (h) a Brisbane firm lost hundreds of pounds last year owing to grading; (i) grade is no assistance to the sale of butter.

LONDON'S POINT OF VIEW.

Before dealing with the above, let me point out that the anti-graders in Queensland have had no experience of the London butter trade; and, consequently, are at the mercy of reports, which, though given in all good faith, may be misinterpreted by mistaken ideas and feelings of prejudice against any good which grading may do for the industry. Had the Queensland objectors examined the produce of the State as it opened out in London last season, sufficient evidence would have been available of the shortcomings of manufacturers and exporters to have warned them of the very great danger the industry was exposed to had grading not come to the rescue of the producer. This I shall attempt to prove; meanwhile let me reply to the reasons offered by deputations against the system.

(A)—IN COOL STORAGE.

It is an established fact amongst trained judges of dairy produce and authorities in the science and practice of dairying that butter manufactured from carefully ripened cream will retain its fine flavour, and maintain its keeping properties when properly stored for a period exceeding the return journey from Brisbane to London. An improvement in flavour may be observed in butter after a period of storage at a temperature sufficient to preserve its good qualities, provided the butter was graded a day or two after manufacture, when the true flavour had not properly developed, to become fixed in the butter.

My researches into this subject, which date back a number of years, demonstrate that butter affected with weedy (not stale) flavours improves when kept at certain temperatures, and this has been used as an argument against Government grading; but as the question is of a deep scientific character, although of practical significance, I do not consider it necessary to dwell upon it here. At the same time, I wish to point out that the proportion of weedy

butter in a season's export is small, and as a result of the flavour weakening in cool storage every consideration is given to this in the classification of the butter.

(B)—WHEN IT REACHES LONDON.

That is quite so, if the temperature of the produce is not low enough to stop fermentation, and had it not been for the attitude of the Department of Agriculture two years ago, when the Department's demand for lower temperatures in the storage of butter grieved manufacturers, there would have been cause for complaint in this direction. When this was a burning question, I stated at a deputation which waited on the then Minister for Agriculture (Hon. D. F. Denham) that 20 degrees Fahr. was necessary for the oversea carriage of good butter, but a second grade would require at least a temperature of 10 degrees Fahr. to prevent it from deteriorating into a third grade. This question will be fully dealt with in the April Journal, and I would advise readers to study it carefully.

(C)—CHANGES EN ROUTE.

For a further answer to this conundrum I would refer the producer to the criticism of mixed brands of butter which is given in this report; but the chief fault I found in Queensland grading was the kind consideration the graders showed manufacturers in classing the butter, which amounted to leniency.

(D)—DIFFICULTIES OF GRADING.

Climatic conditions and food are factors of some importance, and this might have called for consideration a few years ago when grading was first considered. Now it has been shown not to interfere with the principle of grading and the marking of boxes.

(E)—HOW BUTTER IS PURCHASED.

Yes, in the case of some brands from Queensland, the London buyer has found it absolutely necessary to treat every box under the "iron" as the indiscriminate mixing of the brands, and otherwise careless handling by manufacturers has demanded the exercise of this precaution in the purchase of the butter. Likewise have London merchants deemed it imperative to weigh every box of butter from some Queensland factories, with the result that the producer of Queensland has suffered.

(F)—STAMP NOT A GUIDE.

That is why Queensland has not been reckless in applying the superfine stamp. But for what reason is this being used as an argument against grading, when so much was previously said in support of the stamp? It seems to me that objectors to grading find their views do not coincide, and that it is becoming difficult to propound new "theories."

(G)—VERY LITTLE LOWER.

Get the confidence of the British trade in the reliability of factory grades and the difference will be more marked, excepting when the demand for seconds is in excess of the supply, perhaps through market conditions, which are thoroughly known to anti-graders as a cause of prices being inconsistent with the quality of the butter, but I shall deal with this matter fully in another issue of the Journal.

(H)—NO EVIDENCE AS TO LOSSES.

No evidence was forthcoming to show that a Brisbane firm had lost hundreds of pounds through imperfect grading. I know that thousands of pounds have been realised by Australian manufacturers through "first class" factory brands, which contained second-grade butter, being accidentally stamped with the first grade mark. When export butter is not bought on consignment, what has the shipper to say against grading?

(I)—GRADE NO ASSISTANCE.

That grading is of no assistance to the selling price of butter has been dispensed with, and I might add that when grading was introduced it appeared to have staunch support from some of those who now are discrediting the work of the graders. This I attribute to a thoroughness in the system of grading, and the object for which it was enforced being more fully realised.

AN AUTHORITATIVE REPORT.

Since the preparation of these answers to aggrieved members of the industry, a valuable contribution on grading has appeared in Messrs. Weddel and Co.'s review of the produce trade for the past season, and in which a tribute is paid to compulsory grading as carried out in Queensland. The proprietors of this review are well known throughout the agricultural world, and their opinions are of more than passing interest to readers, and producers in particular.

GOOD BUTTER NOT DUE TO FACTORY MACHINERY.

It has been asserted by a prominent Queensland authority on dairying in his monthly "Gazette" that the good quality of butter from Queensland was chiefly obtained through the introduction of modern machinery into factories, and not in any way to grading. This, no doubt, assisted in improving the butter, but an important factor was the greater care shown by the farmer in the treatment of his cream, and he is to be complimented in the advance he has made in the face of hurtful agencies accruing from suicidal competition for his supplies. Were the power of the steam engine the cause of the improvement, there would be no need to enforce the provisions of the Dairy Act, as the flavour of inferior cream would be corrected within the four walls of the factory and without the aid of trained butter-makers.

PRIZE SHOW BUTTER.

The classing of cream and attending to matters which are given in this report as essential to the uniformity in the quality of butter was fully borne out in the success of Queensland factories at London, and this is accepted by some leading judges of produce as a substantial argument against Government grading. It certainly serves to illustrate what the State is capable of doing in the production of a choice article, and I have repeatedly stated in public and in the Press that Queensland is in a position to put on the market butter of a quality equal to the finest exported. But why should so much capital be made out of the victories of the show stand, when it is known that competitive produce is made for one purpose only—to win a prize? To obtain this distinction, which is certainly creditable to manufacturers, every possible care is taken in the selection of the cream, and strict attention is given to all that pertains to the making of a fine product.

What, in my opinion, is chiefly desired by our factories is to carry the New Zealand and Danish practice into operation each day, and manufacture butter that will take a prize in the open market every time the brand is offered for sale; that prize to be pounds, shillings, and pence, to which is added the confidence of the buyer in the even quality of his purchases.

The awarding of trophies by agricultural associations for butter exhibits wants remodelling. Surprise examinations of factory butter should be made from time to time throughout the season, and without the knowledge of the factory. To do this effectively, no difficulty would be met with, as the export produce of the factories of the State may be sampled in Brisbane under the most favourable conditions for careful judging.

POOR QUALITY BUTTER.

In contrast with first-prize produce much of the butter arriving in London last season might have been equal in quality to the finest in the London

market had not the intense competition amongst proprietary and co-operative factories been responsible for the purchase of low-grade cream at the same price as the choicest quality, and which figure was, and still is in some instances, equivalent to the market value of first-class butter. This ruinous and abusive practice was intensified during last export season by an exorbitant price being given to the leading proprietary factories for the whole output of butter for the shipping months of the year on a stipulation that the butter passed the Government examination as first class. Doubtless the factories enjoying this privilege, and in particular the less fortunate ones, found very great difficulty in paying the high price for cream against the inferior and mixed quality of the butter manufactured; but the Department was not partial to the factories in the bitter struggle for the cream supply when examining the exports, and efforts were made to treat the produce as its quality demanded, and perhaps this is one of the reasons that the grading is characterised as unduly severe.

OPINION OF AN ENGLISH AUTHORITY.

The following is an extract from a letter the writer recently received some months ago from one of the most prominent of London produce authorities, and whose opinions on export dairying matters generally are accepted throughout with the highest respect and the greatest consideration:—"I see nothing to stop Queensland butter from occupying a high place in this market, and the quickest way to success, in my opinion, is to let people in this country know that you are throwing out all the 'doubtfuls' and branding them according to their deserts. In this way buyers will have a considerable amount of confidence in buying first-grade Queensland butter, as they know they will get an article that will come up to its right standard."

SEVERITY IN GRADING.

One hears daily that the grading in Queensland is far too severe, and, when this is inquired into of the complainants, no other reason can be given than that they differ from the judgment of the grader in marking boxes of their butter second or third class, when, in their opinion, it should receive a higher mark. This is a very weak and childish argument, and it is not to be expected that any other would be given, as there is strong evidence to show that the thoughtless layman is only voicing the opinion of the bombastic exporter, whose heartfelt desire is to see his produce marked superfine or first-class, without any careful examination of its quality. I have no hesitation in saying that the anti-grader in Queensland has inflicted injury on the industry, and the producer should not fail to see it, as when a determined attitude is taken up against careful grading no encouragement is given to correct errors in the handling of cream and manufacture of butter, and it is also adding to the wrongs and misgivings of the trade, which past experience has shown to have been costly to the farmer and the State. Those in responsible positions in the industry should assist the producer and factory to right what is wrong by a more manly and nobler way, and if this were the earnest desire they would then be trying to do what the Australian grader has done—his duty.

A VISIT TO THE ROMA-STREET COOL STORES, BRISBANE.

(By a Representative of the "Daily Mail.")

A visit of inspection to the Government cool stores in Roma street when the butter-grading operations are in progress, will undoubtedly convince anyone interested in the trade that the supervision and inspection by Government officials of all butter, whether for export or local consumption, is a matter of absolute necessity. Not only is the inspection necessary for the purpose of ascertaining the quality of the butter, but also to see that the boxes contain the correct weight.

SHORT-WEIGHT BUTTER.

The Federal Commerce Act contains stringent regulations regarding the weight of produce for export. For instance, if a box of butter marked 56 lb. is found to contain only 55½ lb., the representative of the factory or the person who made the butter is not allowed to alter the marks. The Queensland Agricultural Department has up to the present acted very leniently towards the producers in this respect, and the Government grader has marked the correct weights on the package. This, however, is not to be allowed in the future, and the Customs Department has had instructions to see that the Commerce Act in respect of weights is complied with.

Recently a small consignment from a well-known factory arrived at the cool stores, and four boxes were weighed. The weights were as follows:—51 lb., 51½ lb., 52 lb., 52 lb. Occasionally the boxes do not contain 50 lb., and recently one box was found to contain only 49 lb. 2 oz.

GROSS CARELESSNESS.

The authorities do not suggest that the producers are sending short weight with fraudulent intention, but rather that the errors are due to gross carelessness on the part of their employees. No system has apparently been adopted with regard to weighing the produce at the factories, and the only way to ensure correct weights is for the offenders to be prosecuted, and that procedure is to be adopted in the future. It is agreed that sufficient warning has been given, and no more leniency will be shown.

BUTTER-GRADING.

Mr. Thomson, the Queensland Government Dairy Expert, in a recent report, said that there is little to be desired in the colour or finish of the Queensland product, but the same cannot be said of its flavour and texture. The value of classifying butter is based on the ability of the grader to determine the keeping properties, and that stamps it with the grade indicative of the quality of the butter when opened up in the warehouse of the London merchant in Tooley street. For example, if the flavour showed a trace of stale cream the grader would be seriously at fault if he stamped the butter as first-class. On the other hand, the butter might not possess a disagreeable flavour, but its carrying properties would not entitle a first-grade stamp, as would be shown by the inferior character of the texture. The grader has to consider all the conditions which precede bad flavours—the age of the produce at the time of grading, the temperature at which it is to be stored, and the period of storage. It will be acknowledged by even those who are opposed to grading that, if the butter in the cool stores showed signs of deterioration on arrival, when it arrived in London it would not have improved in quality, but rather to have further deteriorated.

SYSTEM ADOPTED.

The many complaints that from time to time had been received from the butter merchants at home seriously influenced the export trade, and the Agricultural Departments in the different States stirred themselves in the direction of butter-grading and inspection under Government supervision. In Queensland, the officers of the Agricultural Department take the flavour and texture of the butter as the questions of primary importance, colour, packing, &c., being of secondary consideration, although these factors are by no means neglected.

ROMA-STREET COOL STORES.

At the Roma-street Cool Stores during the busy season 2,500 boxes, or 62½ tons of butter, are received weekly, and it is impossible to expect that the staff engaged would be able to examine each box. The grader works on the average system. A number of boxes are picked out indiscriminately from a consignment, the lids of the selected packages are removed, and the grader,

generally Mr. Winks, the chief grader of the Department, inserts the "trier" into the butter and takes a sample. He smells it, and, if it is not too rank, he tastes it. So keen does the palate become with practice that the grader is able to detect the slightest taint. Perhaps the flavour of the produce is very pronounced, and if that is so it is classified as a third grade; if it is slightly off, it is classified as second grade. Great care is taken with regard to the first-class butter. The expert realises that the progress of a butter factory, or the increase of its export trade, is dependent on his judgment, hence his caution. At different periods samples of butter are taken from the different consignments and forwarded to the Agricultural Analytical Chemist. He ascertains the amount of water, fat, casein, and preservatives contained in it, and the butter factories are supplied with a copy of the analysis.

DATE OF CHURNING.

The regulations under the Queensland Dairy Act provide that the butter factory or producer must place the date of the churning on the outside of the box. In some instances this is not complied with, and in other cases the factories use pencil instead of a rubber stamp as required by the Act. This negligence greatly inconveniences the grader, as he has to minutely inspect the box to see the date, whereas if a distinct stamp were used there would be no difficulty in ascertaining at a glance the date of manufacture. Some of the up-to-date factories, in addition to the date, place the number of the churning on the box; and this assists the grader, inasmuch as if a number of boxes bearing the same number are found to contain a first-grade article, then the rest of the same churning is classified accordingly. If all producers would adopt this system, it would relieve the Government officials of a lot of labour.

MIXED BRANDS.

Many of the butter factories, it is to be regretted, adopt the system of bluffing—that is, they mix butter. In boxes with the brand denoting the first-grade butter of the factory are to be found from three to four distinct classes. For instance, yesterday morning ten boxes of butter, part of a consignment from a well-known factory, were tested at Roma street. They were all branded and dated alike, and the first box opened contained first-class butter, the next was rank, and the third contained an overplus of salt, and the fourth was "off." The remaining boxes were also of poor quality, and the whole consignment was consequently marked as second grade. Among this consignment there may have been several boxes of good quality, but, owing to the carelessness of the grader at the factory in not separating the butter, the whole consignment was placed in the second class, and the factory has accordingly suffered. The graders state that this sort of thing is of frequent occurrence.

Opponents to compulsory grading argue that cases often happen that butter graded as second class in Queensland fetches the first-class price in the London market, but that can be explained by the fact that the buyer at that market has had the bad luck to select for trial one of the good boxes that had been mixed in with the consignment. The producer accordingly reaps a better price; but in the long run he suffers under the old adage, "Once bit, twice shy." The buyer next time remembers that he has been had, and refuses to bid for the butter under that brand.

PROPORTION OF WATER.

Now that the Butter Bill has become law in England, precautions are to be taken by the British authorities to see that the proportions of water, fat, casein, and preservatives in butter shall not exceed a certain standard. Recent examinations of Queensland export butter have shown that the proportion of water has exceeded 20 per cent. The Federal Commerce Act, the Queensland

Act, and the British Butter Act have fixed 16 per cent. as the maximum amount of water allowable, so it will easily be seen that cause for complaint is found also in this direction.

It is these sorts of complaints that the Government desire to prevent, and the Agricultural Department, in the interest of the producer and the industry generally, is taking every precaution to stop the abuses of the export trade. It is stated that, amongst the worst offenders in Queensland with regard to short weight, water in the butter, and brands of mixed qualities, are some of the greatest opponents to the system of Government grading. The Agricultural Department is only too willing to allow factory managers and others to be present while the grading is taking place. As a matter of fact, the town representatives of the factories do attend and see that the weights are correct. If the factory managers would arrange for a visit of inspection to the cool stores, so that they could see the manner in which the butter was classified, it would undoubtedly be to their advantage. It would also tend to remove from their minds the mistaken idea that the officers of the Agricultural Department are their enemies.

COMPULSORY GRADING OF CREAM.

Mr. Thomson, in an interview, mentioned that if a compulsory grading of cream was insisted on the butter trade would benefit. He referred to the commendable example of the Millhill Company, at Warwick. That factory has decided to grade all the cream that is brought to the factory, and to pay according to its quality and freshness. If other factories would adopt this system it would be to their advantage, as the farmers would be encouraged to bring the cream along when it is fresh. At present no distinction in price is made between stale and fresh cream—"Daily Mail."

GRADING AND PRICES.

One of the most cherished bits of "evidence" in the breast of the anti-grader against the official inspection of produce are the prices obtained for butter which has been exported to London under the Government stamp—first, second, or third, as the case may be. It may follow, and has followed, that the difference in money obtained for second and third grade butter has amounted to as little as 1s. per cwt., in other instances the price has been the same, and it has occurred that third-rate butter has realised as much and even more than the second grade. Let me explain how this may happen, beginning with the influence of market. As every person associated with the distribution of dairy produce in Great Britain knows, there are periods when the demand for inferior grades of butter and cheese exceeds the supply, and this condition of the market may force the price of the produce to a figure equivalent to the selling price of superior grades. At such a period, and it not infrequently happens, a third-rate butter may bring, say, 104s. or more, but upon the arrival of fresh shipments of produce and a change in the market the low grades are thrown to one side, and the superior supplies of butter are sought after at prices corresponding to their true values. Instances of the above have come before my notice on several occasions, and I was aware that prices paid for inferior grades of Queensland butter have been absurdly high, and that the information would prove hurtful in the minds of the unscrupulous anti-graders; and, as already pointed out, not one of this class of men in Queensland has had an hour's experience of the British markets, but he does not wish to give producers the truth regarding these sales; on the contrary, misrepresents everything; and some anti-graders are known to me to have deliberately and persistently lied to gain a point against compulsory inspection of produce. How frequently has the man in search of truth relative to the prices of Queensland grades of butter been comfortably housed in a business office in Brisbane and asked to accept the anti-grader's dictum from his long list of figures proving the vagaries of the

world's markets? How many inquiring visitors have been converted against the truth through the persuasive powers of the anti-graders whom I have shown to be retarding the progress of the industry? It is the producer who has been wronged, not the butter graders of Queensland, as I shall conclusively prove before I conclude this report.

Next we come to another condition existing in the markets of Britain, which may very considerably influence the prices of low-grade produce. It follows that the market is frequently glutted with inferior butters. These are held back till an opportune period, when everything is done to obtain the highest rates for the produce; and in the distribution of this butter so great may the rivalry be amongst merchants to do their Australian patrons the fullest justice that boxes of very poor butter may pass into the hands of the retailer at prices beyond the value of the produce. All this is cabled to the Brisbane broker, commission agent, or factory, as the case may be, as I have already pointed out, and, be he an anti-grader, he greedily seizes the opportunity to mislead the people and slander the work of the official inspectors of the Department of Agriculture.

To illustrate what I have said regarding fictitious quotations for butter, readers might note the phenomenal prices paid in London for Cheddar cheese during the months of April, May, and June of 1907. At my instigation, Queensland forwarded a considerable quantity of cheese to the market during the latter two months, and secured as much as 60s. per cwt. for brands which would not have brought more than 40s. under ordinary market conditions. The finest cheese from the State arriving at the same period, which in flavour and texture was far superior to the 60s. quality, realised only a few shillings more.

FAMINE RATES.

We have still another example of what the anti-grader would term a true analysis of the value of butter inspection. As I write, dairy farmers have a splendid opportunity of realising the effects of a phenomenally strong market in the disposal of all grades of butter. Pastry butter and second and third grades will be disposed of at prices a little lower than choice brands, and this will show where an argument against grading meets with absolute disaster. In past seasons many instances could be quoted of the market jumping through what one might call temporary starvation, and cablegrams have been received in Brisbane showing that second grades have accordingly brought the same price as first; but, as a rule, when this is announced, no mention is made by the shipper whether it was a high second (87-89) or a low second (83-85) which obtained the premium. In the case of extreme market conditions, however, distinctions in awards for points are not always considered, for reasons which need no explanation to the intelligent reader. But the stamping of the boxes stands out pronouncedly as a protection against serious dangers which accrue to the distribution of a country's export at famine rates; and Queensland will add much to her credit in Great Britain through the strict grading and marking of boxes now and at all times.

To account for these erratic prices we have another cause which the factory is responsible for, and which the anti-grader would appear to have deliberately encouraged in every butter-making establishment in Queensland—namely, the putting up of boxes of different grades of butter under a factory's choicest brand. And so ruinous was the practice to the reputation of the industry and the producer in particular that stringent measures had to be taken by me to stop it. The grading officers were, therefore, instructed to stamp all brands of butter which contained different grades with the official mark indicative of the average quality of the produce, and where a factory persisted in the mixing of their choicest brands, by throwing in third grades and boxes of pastry butter, the third-class stamp of the Government was to be used to an extent demanded by the seriousness of the offence. So glaring were instances of this

sort in the London market that I had a letter forwarded from the Agent-General's office to the merchants of Tooley street, which reads as follows:—

[COPY OF LETTER.]

“Queensland Government Offices,

“1 Victoria street, London, S.W.,

“15th April, 1907.

“SIRS,—I have the honour to report that instances of factories mixing boxes of first and third class butter under the factories' choicest brand has come under my personal notice during recent inspections of dairy produce at Tooley street. In each case, the graders' examination was thorough, but to the casual observer it would appear that the Queensland Government officers had erred, as boxes of first-class butter bore the 'third-class' mark of the Government, a course following the stamping of the boxes according to the average quality of the butter found in the brand inspected by the officers at Brisbane.

“This alone should suffice to show the value of Government inspection of butter as a protection to the buyer against errors on the part of manufacturers. I would, therefore, suggest that the buyers of Queensland butter should assist the Government through their agents in Queensland by bringing under the notice of factories the necessity for stringent care in the direction stated.

“I have the honour to be,

“Sirs,

“Your obedient servant,

“G. S. THOMSON, Dairy Expert for Queensland.

“Messrs. ———,

“Produce merchants, Tooley street.”

Seldom a week would pass without my report to Brisbane disclosing serious faults in the classing of the butter at factories, and although the mistakes were brought prominently before those responsible for the progress of the factories little or nothing was done to remedy the evils until my return from London, when the inspection of Queensland butters was made more stringent. The following are extracts from my London reports:—

“My experience in London has demonstrated to me that damage has been inflicted on the name of Queensland as a butter-producing country by the action of manufacturers in shipping third-grade butter in boxes bearing the same brand as that indicative of the choicest product, and by mixing first, second, and third grades in parcels similarly branded. It has been fully borne out that the consideration shown manufacturers by the grading officers has been taken advantage of to an extent that nothing short of the most drastic measures are necessary to remedy evils which are costing the industry thousands of pounds in reduced prices. I have seen sufficient of our manufacturers' mistakes to warrant fresh regulations to safeguard the producer from further injury in the British butter markets.”

Extract from a letter dated 21st February:—

“This butter has been sold as the choicest grade, each box bearing the best brand of the factory. It was again sold by the Tooley-street buyer on the strength of the factory classification, but after delivery the butter was found to be made up of different grades, and accordingly the parcel was returned to Tooley street as not up to the guarantee given by the factory. From my examination of this butter I have no hesitation in saying that the factory brand was misleading, not only to the agent in Queensland and the buyer here, but to the Government of Queensland, who grade the butter.

“This factory is inflicting great injury on the reputation of its butter. Inferior produce should not be shipped under a brand that is likely to be taken to represent a choice grade of butter.

"The factory should be advised to exercise more care in classing the cream. It is evident from the mixed condition of the butter that buyers will not put confidence in the brand.

"Three boxes of this brand were examined; one box showed the mark of the grader's iron, and was marked 'Tested.' It was third grade in quality, as specified by the grader. The other boxes were found to be of first-grade quality."

Many contributions in the Australian Press have dealt severely with factories for mixing grades of butter, and it has been proven that the claims of the anti-grader against the examination of exports by virtue of high prices being obtained for low-grade produce are, as already stated, absolutely absurd. Here I shall give copies of correspondence which deal more effectively with the subject referred to.

A quantity of butter stamped with the factory's choicest brand was found to be mixed in quality, and immediately the matter was reported to the factory, which brought the following reply from the manager:—

"The ——— Dairy Company,
"29th October, 1907.

"The Under Secretary, Department of Agriculture, Brisbane.

"SIR,—I have the honour to acknowledge your letter of the 26th instant.

"This factory has always been careful in not mixing grades and only putting one quality up under any one brand, and, with all respect to the opinion of your graders, I am quite positive the consignment in question was not mixed in quality.

"I consider this factory has been very harshly treated in this connection, and we have lost all faith in the grading system.

"We have had numerous instances of butter having been graded second and third by your Department, graded by competent men in Brisbane, and they have repeatedly given it as their opinion that the butter was of first-class quality. These facts speak for themselves, and we are of opinion that the present grading system is, to a great extent, detrimental to our interests as butter producers.

"I have the honour to be,

"Sir,

"Your obedient servant,

"———, Manager."

A request as follows was sent to the Agent-General for Queensland to have the butter examined:—

"25th October, 1907.

"SIR,—I have the honour to inform you that ———, grading inspector under the Dairy Produce Acts, reports that when examining a consignment of ——— boxes of ——— butter on the 16th instant from the ——— factory, the quality of the butter in the different boxes was found to vary considerably.

"Owing to the irregular quality of this butter, which was shipped to England by the ———, it is asked that on arrival in London it may be re-examined, and any information deemed advisable given to the purchaser. The boxes are legibly stamped '12 Oct.' in figures and letters $\frac{3}{4}$ -inch long, on the same side as the Government grade stamp. It is desired that special attention may be given to the boxes marked 'Tested.'

"I have the honour to be,

"Sir,

"Your obedient servant,

———, Under Secretary.

"The Secretary to the Agent-General for Queensland,

"1 Victoria street,

"London, S.W."

The Agent-General furnishes the Department with the examiner's report:—

“London, S.W.

“19th December, 1907.

“SIR,—I beg to inform you that I have this day examined a shipment of _____ boxes marked _____, stamped ‘12 Oct.,’ and third grade, per ss. _____.

“Ten boxes were opened, five marked ‘Tested’ and five without. The quality of both lots varied very considerably—of the five ‘Tested’ boxes, two were bad, both as regards flavour and aroma—these were graded true; the other three were very much better, and quite entitled to a second-grade stamp.

“Regarding the five boxes without the word ‘Tested’—one box was ‘rank,’ three boxes were good, and equal to second-grade butters, while the fifth box was a real good box of butter and quite equal to first-grade _____ butter by the same steamer.

“Through the mixing of this consignment the factory must have lost a very considerable sum of money, as the bad classing caused a probable loss on two-thirds of this shipment of from 2s. to 4s. per cwt.

“I am,

“Sir,

“Your obedient servant,

“_____.

“The Acting Secretary,

“Agent-General for Queensland,

“1 Victoria street,

“London, S.W.”

Before leaving London I submitted a short report to the Agent-General on my inquiries into the Queensland dairy produce trade, a copy of which I now give:—

“Queensland Government Offices,

“1 Victoria street, London, S.W.,

“24th June, 1907.

“SIR,—I have the honour to report on the _____ shipment of _____ boxes from Queensland, and to draw your attention to an improvement in the general quality of the produce. It is also desirable to again bring under your notice errors in manufacture which are seriously militating against the progress of the industry—namely, the uneven classification of cream at the factories, and the indiscriminate mixing of boxes of first, second, and third grades of butter. Repeated mistakes of this kind have occurred during the season, consequently buyers have not the same confidence in factory brands, and I might add that the grading of butter by the Government, although most valuable in checking this weakness, has, through the fault of Queensland factories, been robbed of much of its worth to the State. Had I not been a close observer of the condition of shipments of our butter upon arrival in Tooley street, I should have criticised any unfavourable comment on the ability of Queensland factories to place on the British market produce true to the descriptive brands. These remarks may appear on the side of severity, and some people may say they are quite uncalled for, but such is far from being the case. To overlook what I have complained of, and which I believe to be Queensland's greatest defect in building up a sound export trade, would be an oversight on my part, more especially when I have been confronted from day to day with its disastrous effects on the success of the industry and the reputation of the butter factories of the State. But apart from this Queensland has accomplished a good deal to merit the attention of British buyers of dairy produce, and very striking illustrations have been afforded me in support of the State as a producer of butter of the choicest quality. It is also admitted by the London produce trade

that Queensland has a great future as a contributor to the butter market of Britain, and all agree that with strict attention to the handling and grading of cream the State will have little to fear in competition with other countries.

"In pursuing a policy of speedy improvement of the industry, the requirements of the world's markets should not be lost sight of, and I have good reason to think that Queensland has erred in opening up an export trade with London and other produce centres in Britain before acquiring a knowledge of the demands of the buyer and consumer, and which has reacted against the disposal of the butter at high market rates. Such information can best be obtained in the distributing centres, and I am of the opinion that thousands of pounds would have been saved to the dairy farmers and produce merchants and exporters of Queensland butter had this not been overlooked. And I must confess that the knowledge the State possesses with regard to the defects in Queensland produce, noticeable only on the floor of London warehouses, is exceedingly meagre, and, from experience gained in Tooley street during the past six months, I can only say our manufacturers and exporters have a great deal to learn in the production and export of butter and cheese. Much, however, of what has been observed by me as important to Queensland has already been made known to supporters of the dairying industry, as a previous visit to Tooley street convinced the writer of the importance of a close study of the markets here. The Department of Agriculture in Brisbane has been assiduous in drawing the attention of the State to recommendations accruing from this source, and which, unfortunately, have not received the consideration they merited. It is with some degree of satisfaction that I draw your attention to the following regulations which were suggested to the industry, and have now been confirmed as necessary adjuncts to founding dairy farming in Queensland on sound progressive lines:—

- A.—Compulsory grading of cream.
- B.—Compulsory payment of cream on the basis of flavour as well as fat percentage.
- C.—Compulsory examination of managers for certificates of proficiency in the grading of cream.
- D.—Compulsory aëration of milk.
- E.—Compulsory carriage of milk and whey in separate vessels.
- F.—Cessation of the practice of pooling cream.
- G.—Compulsory stamping of the date of manufacture and churning number on each box of butter.

"These recommendations were all opposed by the industry, the chief objections coming from the factories, and, until they accede to the wishes of the Department of Agriculture as specified above, a much desired improvement in the butter trade of the State will not be forthcoming."

FACTORY INSTRUCTION SUGGESTED.

Those opposed to the inspection of butter, as already remarked, have wronged the grading officers, and they have demanded a change in the system of inspection and factory instruction. But all the instructions in the world would have been useless against the forces which appeared to be working towards the destruction of the vital clauses in the Dairy Produce Act of Queensland, and the course adopted, which is reiterated here, to produce honest brands of butter for export to oversea markets has been a victory for the producer, who, unfortunately, knows not the bad practices of the trade and the wickedness of the anti-grader in whom he puts his trust. The door is now open for the appointment of an instructor to work in conjunction with the grading officers of the Department, and should the Government take this step I feel certain it will be followed with very satisfactory results.

"A PUBLICATION."

The contributions on grading appearing in a Brisbane monthly "paper" have, in the opinion of the writer, been published without due consideration or

even a passing study of the true requirements of the export trade and particularly the Queensland dairy farmer. The "paper" has been almost desperate in its attempts to crush the official inspection of dairy exports, and in its impotent threats and assertions has stated that the efforts of the Department are playing into the hands of the exporter. In the face of what has already appeared in the "Departmental Journal," the dairy farmer of Queensland should quickly decide whether the writer in the "paper," be he editor or owner, or myself has the true interests of the producer most at heart. For the result of an experiment which may particularly interest the "paper" as well as the producers of Queensland, I would refer them to the next issue of the Journal.

DAIRY AND COMMERCE ACTS.

The supervision of dairy exports, which has been in force in Queensland since the passing of the Dairy Produce Act in 1905, has been of unquestionable help to the industry. The Commonwealth Commerce Act has since been introduced, and the value of the measure to Australian dairying is being duly demonstrated. The Commerce Act will be of much greater help when the grading of butter and cheese is made compulsory throughout Australia.

[TO BE CONTINUED.]

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

RETURNS FROM 1ST TO 31ST JANUARY, 1908.

Name of Cow.	Breed.	Date of Calving.	Yield of Milk.	Babcock Test, Per cent. Butter Fat.	Commercial Butter.	Remarks.
			Lb.		Lb.	
Beauty ...	Ayrshire ...	Dec., 1907	851	4.2	40.03	
Careless ...	Jersey ...	20 Oct. "	693	5.2	40.36	
Chocolate ...	Shorthorn ...	5 Mar. "	575	5.8	37.35	
No. 112 ...	Jersey Grade ...	Sept. "	676	5.0	37.85	
Cocoa ...	Jersey ...	Dec. "	815	3.7	33.77	
Gin ...	Shorthorn ...	Aug. "	633	4.7	33.32	
Lass ...	Ayrshire ...	19 April "	529	5.6	33.17	
Laura ...	"	20 May "	703	4.2	33.06	
Pee-wee ...	Holstein-Sh'rth'rn	6 April "	555	5.5	34.18	
Linnet ...	Ayrshire ...	Aug. "	896	3.2	32.11	
Haze ...	"	Nov. "	663	4.4	32.67	
Clare ...	Jersey ...	21 Aug. "	449	6.3	31.68	
Ethel ...	Grade Holstein	22 Aug. "	537	5.0	30.07	
Reamie ...	Holstein-Sh'rth'rn	Oct. "	686	4.1	31.56	
Whitefoot ...	"	28 Sept. "	740	3.5	29.00	
Butter ...	Shorthorn ...	22 Aug. "	625	4.1	28.70	
No. 6 ...	"	Aug. "	516	5.0	28.89	
No. 1 ...	"	Aug. "	881	3.0	29.60	
Gurney ...	"	Aug. "	722	3.7	29.91	
Honeycomb ...	"	23 Aug. "	665	3.9	28.98	
Lemon ...	Guernsey-Sh'rth'n	Aug. "	679	3.8	28.90	
Dripping ...	Holstein-Sh'rth'rn	28 Nov. "	622	4.2	29.25	
Mona ...	"	Oct. "	735	3.3	27.16	
Restive ...	Shorthorn ...	21 Aug. "	731	3.5	27.83	

The cows were grazed on different fields during the above period (no hand-feeding).

I wish to point out that, after many years of careful observation, I have come to one conclusion regarding the College herd—viz. we cannot obtain the best results because of the constant change of milkers, together with the fact that, no matter how careful one may be, "learners" occasionally milk our best animals.

SHOULD COWS BE STRIPPED?

Should cows be stripped after milking or not? Discussing this question in an English journal, Professor McConnell, the eminent English dairy expert, says that he is one of those who all his life was accustomed to see cows stripped out by a responsible person, who followed after the regular gang of milkers; but recent events caused him to change his mind as to the advisableness of the practice. Many authorities have pointed out aforetime that, as the milk secretion was intimately connected with the nervous organisation, the stopping of the milk and then coming back to start it again were doing the cow harm, as it amounted to restarting of the nervous energy. About a year ago Professor McConnell stated his belief that stripping was absolutely necessary. He now begs to take it all back, as since then he has tried his cows the other way, with the most satisfactory results. They are now milked out at one sitting, and if a small quantity be left in the bag, the professor argues, it does the cow no the producer, who, unfortunately, knows not the bad practices of the trade and possible gain then in stripping, he contends that it is discounted by the harm done to the cow by the stripper in starting her nervous force once more. Alongside of the cessation of stripping, however, another practice has also been abandoned—that is, the changing round of the gang of milkers, so that each cow is milked by each milker in rotation; every man now sticks to his own lot of cows, and as one cow drops out and another comes in the lots are kept as equal as possible. As far as Professor McConnell can see, the results to the cows, to the milkers, and to the milk yield are eminently satisfactory, and he, for one, will not go back to the old system.

FEEDING THE CALF.

Some dairy farmers always remove the calf from the cow as soon as it is born. This is all very well if the well-being of the calf is not a consideration, but, although the latter will thrive fairly when hand or bucket fed, it will never become such an animal as that which is allowed to remain for the first two or three weeks with its mother. To all appearance the milk is the same, and the calf gets as much as in the natural way; but, for all that, there is a marked difference in the results, and it is undoubted that the sucking calf will not suffer from such complaints as scouring to anything like the extent that the bucket-fed calf experiences.

TREATMENT OF DAIRY UTENSILS.

When cleaning dairy utensils, always rinse them first with cold water. If hot water is used, the sticky albumen coagulates on the sides and bottoms of the tins and is very troublesome to remove. After rinsing with cool water, wash thoroughly with hot water, using plenty of alkali, such as washing powders or caustic soda, and “elbow grease.” Then again rinse in fresh, hot water, and set them in the air to dry.

THE CURE OF MAMMITIS.

Mammitis, an inflammation of cows' udders (causing a form of diphtheria in human beings), which threatens to overwhelm the dairy herds of New Zealand, has been successfully attacked by a German specialist by injections. The disease germs gain admission through the milk canals, and the German therefore attacked them along the same channels. He first thoroughly milked the udder, and then cleansed it with warm soapsuds and a 3 per cent. solution of creolin. After the udder had dried, injections were made into the milk cisterns with solutions containing 5 per cent. creolin or camphorated oil. The treatment was repeated three times daily, and in nearly all cases brought about prompt improvement.

Horticulture.

FLOWER GARDENING.—No. 2.

By THE EDITOR.

PLANTS SUITABLE FOR OUTDOOR CULTURE.

ROSES.

Of all outdoor flowers, roses deservedly take first rank. However humble or modest the garden may be, the rose is sure to find a place in it. Although not indigenous to our climate, there are few countries in which the rose has found a more congenial home, and by a careful selection of the best varieties a display of bloom may be obtained throughout the year. It is about the most useful plant that can be found in any garden. The variety of colours, the quantity of blooms that the plants produce, and its delicious perfume, place it above all others.

That there is a growing demand for roses cannot be doubted, but the amateur should be very careful in the manner in which he attempts to plant roses when he receives them from the nursery. For a situation, a site apart from other plants should be assigned to them, if possible—open, but sheltered from high winds, and not surrounded by trees, as closeness has a tendency to cause mildew and other diseases.

They adapt themselves to almost any soil, but that which is specially suited to them is a deep loam of a greasy nature. If such is not to be obtained, the best must be made of the conditions at hand. If the land is strong, retentive clay, it should be thoroughly drained, as in no case will the cultivation of the rose be a success where the drainage is at fault. Stiff, heavy soils may be rendered quite friable, and their fertility greatly increased by burning in dry weather. To do this, all that is required is to break up the ground into a fallow, and, when fairly pulverised and dry, by the aid of a little wood or grass it is burnt, when the consistency will be quite changed from a stiff unworkable clay to a free and open condition. It is essential in planting that the habit of the variety should be understood, as the tender and more delicate kinds are often crippled, as it were, through being planted along with their more robust and vigorous relatives. When planting, see that the roots are well spread, and cover them with soil, and press as firmly as possible; most of the failures in rose cultivation arise from loose planting and using fresh stable manure, which is fatal to the rose. Any manure which is mixed with sawdust should be studiously avoided, as it makes the soil too loose and sour, and also attracts white ants. The rose will take any amount of manure after the first year of planting if it is thoroughly decomposed, or, better still, if it is in a liquid state, with a good mulch around the plants to keep the ground moist. Then, when watering, the water will all the sooner penetrate to the roots, and gradually work the manure down. Artificial manures are, in some cases, good, but if the supply is not constantly kept up the plants die back, and even at the best it seems only to put false life into them. Bone-dust is really good, as the plants are continually fed as the bone slowly decomposes. Its use also ensures freedom from seeds of weeds and grass, always contained more or less in natural manures.

After planting, give a good watering. Should any of the plants have become shrivelled in appearance through exposure or careless packing, they will soon recover if placed lengthways in a trench and covered with about 3 inches of soil and well watered. In three or four days they may be taken from the trench and planted with safety.

PRUNING.

Pruning forms an important part of rose culture. No definite rule can be laid down for pruning roses, as the habit of each variety has to be considered, but generally it may be taken that of the two classes, dwarfs and climbers, dwarfs may be pruned to any extent as a rule, and the more severely they are pruned the finer are the flowers. A fine effect may be produced in a bed, especially when it is large and of circular form, by planting either a climber trained to a pillar or a dwarf rose worked on a tall stem (standard), surrounded by other standards, decreasing in size to dwarfs at the edge. Climbing roses should have the old wood cut out annually, and the young shoots trained in their places. Train pillar roses with one strong leader, remove weakly branches, and shorten in all laterals.

Moderately weak-growing hybrid perpetuals require to be pruned down to two or three eyes, the weak and crowded shoots to be taken out. The robust will require the same thinning out of superfluous wood, while the strong shoots must be pruned down to 6 or 8 inches in length, and the smaller ones to 4 or 5. If the shoots are left too long, the plants become weaker after each pruning. Some of the vigorous-growing hybrid China and hybrid Bourbons require to be left long, or they will not bloom. Remove weak shoots, old wood, and branches which cross each other. By pruning half your roses six weeks before the others, a succession of bloom is secured. Experts hold varying opinions as to when and how different varieties should be pruned, but it is really a matter of soil and climate. Blooms are produced only from new, well-ripened wood of the previous year's growth, so it must be remembered that new wood each year is a vital necessity—that it pays to rejuvenate the trees by replacing old standard limbs with new growth when development seems to be stagnating, and also that the first work of the pruner is to cut out all dead wood and weak or soft watery shoots. Bourbons should be cut as soon as they have finished flowering. The hybrid teas resulting from the hybrid perpetuals crossed with tea and noisettes should be pruned according to habit and growth. As a rule, they do not need hard pruning, but sorts like Lady Mary Fitzwilliam can be pruned close. Tea, noisette, and Banksia roses should not be pruned early in cold, frosty districts, but hybrid perpetuals and Bourbons will not suffer by it. With rampant growers it is sometimes advisable to tie down the strong shoots, as this checks growth and induces flowering. Removing leaves also lessens vigour. Two roses, pruned at different times, will not flower together. Tea roses do not require severe pruning.

PEGGING DOWN.

Under good cultivation, the result of "pegging down" is a bed of roses, showing a mass of first-class bloom, not to be equalled under any other known system. The *Géant des Batailles* is magnificent, and others would doubtless prove equally effective. From strong, healthy roses, on their own roots, train five or six stems from the ground of equal length. When they are quite ripe, and before the buds break, prune them all to 18 inches or 2 feet in length. Have sufficient hooked pegs ready, and carefully bend down the shoots one at a time, without straining, flat on the ground, pegging them firmly down. The shoots should be arranged at equal distances, and will thus radiate all round from a common centre. Almost every bud will produce a spur with a splendid head of bloom, and a batch of strong shoots will grow upwards from the centre of the plant. When the bloom is all over, the old shoots are all cut away clean, and as soon as the new shoots are ripe they are pegged down in their turn as before.

PROPAGATING FROM CUTTINGS.

The work of the rose-grower commences generally with the propagation and growing of the plants, and the amateur usually begins with cuttings. Rose plants for forcing purposes are generally grown from cuttings of the new wood. The rule usually given for learning if the plants are in proper

condition to be used as cuttings—*i.e.*, when in bending a branch the wood snaps—does not hold good with roses, as cuttings should not be made until the buds in the axils of the leaves have become firm and hard.

Some consider that the lower buds on a stem are in good condition when the flower buds are ready to cut, while others believe that the best time for making the cuttings is when the buds begin to show colour. At any rate, the cuttings should be made before the leaf buds begin to swell. The cuttings made as soon as the buds have formed and the wood has lost its succulent nature will root quicker, and a much larger percentage of them will form roots or “strike,” as it is called. If the variety is a new and a choice one, the blind shoots, or those that have not formed flower buds, are often used for making cuttings. While it may be done occasionally without marked injury, if persisted in the tendency will be to develop plants that form few flowering stems, and the results will not be satisfactory, so that the continued use of the blind shoots is not to be recommended. When the stems have long internodes, and particularly if it is a new sort, a cutting should be obtained from every good bud, but those at the lower part of the stem and all at the upper portion that are to any extent soft and succulent should be rejected. The cuttings of varieties with short joints should contain two or more buds. Cuttings should be from $1\frac{1}{2}$ to 3 inches long, with one bud near the top at any rate, and with the lower end cut off smoothly at right angles with a sharp knife. If the upper leaf is large, about one-half of it should be cut away and the other leaves (if any) should be rubbed off.

The cuttings should be dropped into water to prevent their drying out, and as soon as possible should be placed in the propagating bed. This should contain about 4 inches of clean sharp sand of medium fineness, and should have heating pipes beneath to give bottom heat. Set the cuttings in rows about 2 inches apart and $\frac{3}{4}$ of an inch in the row, and press the sand firmly about them. At once wet them down thoroughly, and if the weather is clear and bright the beds should be shaded during the middle of the day for the first week. The propagating house should be kept at a temperature at night of 58 or 60 degrees, with about 10 degrees more of bottom heat. During the day it should be well ventilated to keep up the bottom heat, and thus promote root development, and to admit fresh air, but a temperature 10 degrees higher than at night is desirable.

In about three or four weeks, with proper care, every cutting should be rooted. The requirements for success as noted above are: Good cuttings, clean sharp sand, a proper temperature, shading when necessary, and an occasional wetting down of the bed in order that the cuttings may not at any time become dry. If the house is inclined to dry out, or, if the weather is bright, the cuttings, as well as the walks, should be sprinkled occasionally, and the ventilation should receive careful attention. It is best to use fresh sand for each batch of cuttings.

When the roots are $\frac{3}{4}$ of an inch long the cuttings should be potted off into 2 or $2\frac{1}{2}$ inch pots, pressing the soil firmly. The best soil for the potting of rose cuttings is made of equal parts of leaf mould or decayed pasture sods and garden loam, with a little cow manure and bone-meal and sand in proportion to the heaviness of the soil. After being potted, the cuttings should be placed in a house with a night temperature of a little less than 60 degrees. They require the same care as other plants, careful watering with an occasional syringing to keep down red spider, proper ventilation, and an avoidance of draughts and direct sunlight for a few days being the main things desired.

Unless tobacco stems are strewn on the beds, it will be necessary to burn tobacco stems once or twice a week in the house or syringe them with tobacco water. From the time the cuttings are potted off until they have finished flowering and are ready to be thrown out or rested they should be kept growing, every precaution being taken to avoid a check if the best results are desired. Some prefer to grow the plants rapidly until they are in 4-inch pots,

and then give them a rest. As soon as the roots have filled the pots, and before the plants become pot-bound, shift to 3 or 3½ inch pots. If they have good care, the first batch will soon fill 4-inch pots, and will be strong enough to plant in the beds for early flowering, while the others as they come on can be repotted, and will soon be large enough to be transferred to the beds. Only strong, well-grown plants should be used. By early planting, not only can a large crop of blooms be secured during the summer, when there is a good demand at a fair price, but the plants will be so strong that they will be able to give large crops during the autumn and early winter, when they are most needed.

Cuttings may be rooted at various seasons of the year, and by several different methods. The commonest method is by means of dormant shoots taken as soon as the leaves have fallen and simply stuck in the ground, as already described, but if they are tied in bundles, laid flat on the ground, and covered with sand, except the points, each cutting forms a callus at its base in the course of the winter, and should then be planted out. Roses may be struck from growing shoots whenever they are in a condition of semi-ripeness, which is generally when the flowers fall; the cuttings are best to have heels. The treatment should be such as to keep the leaves as fresh as possible; or they may be set in pots, and, as soon as each has formed a callus, may be removed into a brisk bottom heat, when in a short time they will be fit to be potted off. If roses growing in pots are forced the young shoots may be taken for cuttings as soon as they are 3 or 4 inches in length, inserted in cutting pots, and placed in the propagating frame. Tea-scented roses are most amenable to this kind of treatment, although other sorts may be successfully treated in the same way.

STRIKING ROSE CUTTINGS IN WATER.

The number of subjects that can be rooted from cuttings in water is much larger than is generally credited. Amongst them are roses, although they are seldom increased in this way. As a novelty it has its interesting features. A mode of striking cuttings of the kind in bottles of soft water is a plan as simple as it is practicable, inasmuch as cuttings taken off at any time during the summer will root in this way in from five to six weeks, after which they should be potted carefully in light sandy soil, and placed in a cool frame for a week or so until established, when they are ready for planting where required. The cuttings should be cut clean below an eye joint, and none of the bark bruised. It is a help to make one or two other cuts between the lower eyes, but low enough to be under water. The bottle may be of any convenient size, and may be placed in the greenhouse or room window, as the only attention they require is the filling up of the bottles with water as it evaporates. Another plan after rooting is to fill up the bottle with a compost of light soil, and then pour off as much as possible of the water. When the soil is fairly dry the bottle can be broken, and the young plants potted on. *Impatiens sultani*, English ivy, nasturtiums, and many other things will readily root this way. For the above instructions in raising pot plants from cuttings I am indebted to the "Garden and Field," Adelaide.

BUDDING ROSES.

Roses can be budded when the sap is rising freely in both stock and bud plant. Sap can be forced to rise by liberal watering a few days previously, and better results can be secured by liberal use of very old manure from a cow-yard. A week after budding, the ties should be loosened, else the growth will be strangled by the bandage. Cotton wick is the best for ties or bandages, because it keeps cool and slightly damp, whilst raffia or bast is dry and hot. Suckers will arise from the roots and stems of roses that have been budded, but these should be at once removed. The stems of standards should be protected against the afternoon sun, otherwise the bark will be burned. Buds

should be inserted close to the stem, else the new growth may be removed when cutting back at the end of the season.

In this climate, roses on their own roots generally succeed best, although budded and grafted plants rarely fail to thrive when properly treated. The most suitable stock is that known as the evergreen rose (*Rosa sempervirens*). In Queensland, the cultivation of the rose upon its own roots is generally practised, as the growth and ripening of the wood are so rapid that it is not necessary to resort to budding and grafting, as in Europe, to promote early maturity. By adopting this method we also escape the annoyance of suckers from the stock, and risk of the bud being broken off in high winds. Handsome Standards may be grown from plants on their own roots, by selecting a straight, vigorous shoot of the required height and pruning away the rest of the plant. This stem should be firmly staked perfectly upright; when the wood is ripe, shorten it to about 4 feet high, and allow no buds to grow except the four top ones, from which a well-balanced head may gradually be formed, which, when in proportion, will be the same distance across as the head is from the ground.

The stocks most in use are the Dog Rose, China Cluster, Manetti, Celine, and the Black Boursault. The Dog Rose is used for standards and half-standards. For dwarfs, dwarf standards, pillar roses, and for potting, the Manetti is preferable. When dwarf roses which have been budded are planted out, it will be desirable to plant them quite over the collar of the bud, so that the union of the stock and bud is perfectly covered. If the plants are budded low, there will be little difficulty in planting them thus. The Maiden's Blush is the favourite stock in Melbourne, and may probably be found suitable for Queensland.

SOME SUITABLE VARIETIES TO PLANT.

It must be remembered that we grow roses with different ends in view. One grower devotes his time to raising blooms of exhibition standard; another cares not so much for individual excellence of flower as to having his garden a mass of bloom; while a third prefers flowers for cutting for decorative purposes. Some varieties are valuable in all three directions, while others are pre-eminently so in only one. For exhibition, we require roses whose chief characteristics are beauty and perfection of form, combined with size, brightness, and distinctiveness of colour. These qualities do not always go with vigour of growth and abundance of bloom. If they do, we have roses which deserve pre-eminence; but, unfortunately, a few splendid show varieties are only to be grown for show purposes.

For garden decoration we are not so interested in the perfect elegance and symmetry of the individual flower. We require quantity rather than quality, with a healthy and vigorous habit of growth.

If the desire be for the purpose of cutting for decorative purposes, either for personal wear or for the adornment of our rooms, we are not so anxious for size. We are careful to select flowers which are most attractive in the bud. We require beauty of form, brightness of colour, with as much as possible of the character too often neglected—namely, perfume.

Freedom of bloom is a leading consideration, and white varieties are desirable. It is not often that all these qualities are combined in a single variety, and our estimation of the value of a variety must be largely influenced by the purpose for which we require it.

FOR EXHIBITION PURPOSES

beauty of form, with fair amount of size, is the point of perfection. Size, without symmetry of form, is valueless on the show table. There must be no malformation of bloom or symptoms of a double heart. What is required is a regular shape with full, somewhat high centre, smooth circular outline, and perfect arrangement of petals. A long rose is preferable to a globular rose, and a globular to a flat rose. There must be no suspicion of the eye in sight. Then add size, if possible, brightness of colour, and fragrance. The last, valuable though it be, is a point that can never be estimated on the show table.

SOME GOOD TEA ROSES.

Some time ago, said Mr. George Watkins, in a paper read before the Horticultural Society of Queensland at one of their meetings, three leading experts were requested by the National Rose Society to draw up a handbook on "How to Grow and Show Tea Roses." Their list of twelve best exhibition tea roses is as follows:—1, Bridesmaid; 2, Catherine Mermet; 3, Cleopatra; 4, Comtesse de Nadaillac; 5, Innocente Pirola; 6, Maman Cochet; 7, Maréchal Niel; 8, Mrs. Edward Mawley; 9, Muriel Grahame; 10, Souvenir d'Elise Vardon; 11, The Bride; 12, White Maman Cochet.

Their second twelve is as follows:—1, Anna Olivier; 2, Ethel Brownlow; 3, Golden Gate; 4, Hon. Edith Giffard; 5, Madame Cusin; 6, Madame de Watteville; 7, Madame Hoste; 8, Marie Van Houtte; 9, Medea; 10, Souvenir de S. A. Prince, better known here as the Queen; 11, Souvenir d'un Ami; 12, Sylph.

These are all good roses, and, no doubt, the best in the British climate. For us, in Queensland, it will need revision. The first twelve contain the names of three roses which do not suit Queensland. Cleopatra is always classed as poor in growth, and difficult to manage. It is useless in Queensland, and so is Innocente Pirola.

Comtesse de Nadaillac stands in the front rank of varieties gaining distinction in the home shows as champion bloom. It is there a flower of surpassing beauty; with us it is a poor grower and shy bloomer, little grown, and seldom shown.

Of the second twelve Marie Van Houtte, Medea, and Madame De Watteville are among our best. Madame Hoste and Golden Gate deserve to be more grown than they are, but the rest are very moderate in growth, and not to be strongly recommended. Strange to say, Niphotos, Souvenir de Thérèse Levet, and Perle des Jardins do not find a place.

The following is the selection I would recommend for the neighbourhood of Brisbane at least:—Maman Cochet, White Maman Cochet, C. Niphotos, Souvenir de Thérèse Levet, Maréchal Niel, Souvenir d'Elise Vardon, Marie Houtte, Perle des Jardins, Medea, Mrs. Edward Mawley, Muriel Grahame, Madame de Watteville. (Second twelve): The Bride, Catherine Mermet, Ernest Metz, Lord Tarquin, Empress Alexandra of Russia, Mdle. Francesca Kruger, Madame Hippolyte Jamain, Sylph, Madame Hoste, Madame Elie Lambert, Souvenir de S. A. Prince or the Queen, Madame Camille.

For garden decoration, most of the above may be chosen, adding Edouard Littaye, Wm. Allen Richardson, Souvenir de Rosieriste Rambeaux, Leo. XIII., and François Dubreuil.

POULTRY FARMING.

One of the greatest mistakes made by those who dream of making money by means of a poultry farm is, that they base their calculations on the returns in eggs and chickens upon the results of keeping about 20 hens. They argue that, if 20 hens will produce so much, 100 will produce five times as much. Many have tried it, but there is no record of success. The best returns are those obtained from the fowlyard on the farm. It stands to reason that this should be so. On the farm, the fowls practically feed themselves. They have many acres of run, where they find a variety of food in the shape of insects, grubs, grain, and green stuff. The exercise they get makes them hardy and strong. On a poultry farm, the birds are confined to small runs. All their food has to be bought, and the herding together of large numbers of fowls in fixed houses usually results in the development of disease. A farm without poultry is like a buggy on three wheels. Every farmer should keep poultry. If he has an orchard, the fowls will keep it clean by scratching away the weeds and destroying injurious insects.

Viticulture.

NOTES ON TWO NEW HYBRID GRAPES.

BY DR. THOS. L. BANCROFT

For some years past I have endeavoured to produce varieties of grapes by crossing Isabella and Lenoir (which kinds grow to perfection in the vicinity of Brisbane) with varieties of the European stock, *Vitis vinifera*, such as Black Hamburgh, White Portugal, Muscat, &c.—new varieties that would grow equally well and with a better flavour than Isabella.

I succeeded in producing a good kind by crossing Isabella with White Portugal, mention of which occurs in the "Queensland Agricultural Journal," Vol. XII., p. 425. The late Mr. J. G. Cribb, who devoted a great deal of attention to viticulture in Queensland, regarded it as an "excellent variety." Since then I have been fortunate in obtaining another distinct variety from the same parents—viz., Isabella $\times$ White Portugal. The question might be asked: How is that, the parentage being the same, these two hybrids are so different in flavour, form of bunch, &c.? One naturally would imagine that they would be identical, or at any rate nearly so. To me it appears very remarkable, and it may be that the pollen parent was really not the same in both. I used to get the pollen from Mr. A. B. Webster's garden, at Deception Bay, from a number of old vines, apparently all White Portugal; but it is possible, if they were critically examined by an expert viticulturist, he might detect differences, for there are several grapes which resemble White Portugal closely.

White Hybrid No. 2—Isabella $\times$ White Portugal.

A seedling from Isabella, fruited some years ago, when six years old, has grown into a large vine, with the vigorous growth of Isabella and not appreciably injured by fungus blights; a prolific bearer of remarkably long, loose bunches of white very thin-skinned grapes; when ripe the berries have a faint tint of pink and are transparent; taste very agreeable, entirely different from my White Hybrid No. 1 and from Isabella, partaking of the quality of the pollen parent.

White Hybrid No. 3—Lenoir $\times$ White Portugal.

A seedling of Lenoir; a very vigorous grower, surpassing any other seedling I have raised; it is four years old, and has just fruited for the first time. The bunches are small, the berries only a little larger in size than those of Lenoir, white in colour, thick skinned; in flavour they are too sweet, and, being small, the seeds are much in evidence as in Lenoir. It is possible, however, that this variety might improve as the vine ages. My White Hybrid No. 2 was not so good the first year it fruited as it is now.

I have in cultivation four seedling vines, raised by the late Dr. Joseph Bancroft, possibly hybrids; but I have no literature on their parentage. I should be pleased to supply the Department with cuttings of them and also my own productions for cultivation and report on their merits.

Mr. Rainford spoke favourably recently of a cross, in which Hermitage was the pollen parent, produced by the late Dr. Bancroft; he considered it worthy of experiment.

It is possible this is one of the varieties I succeeded in saving. The original vine grew at the doctor's residence in Wharf street; a good grower and bearer of abundance of bunches of small black grapes with a nice flavour.

Tropical Industries.

ZAPUPA FIBRE.

Much interest has been evinced in the zapupe (or zapupa) plant of Mexico, since we published an account of it in the Journal in December, 1906. At the request of several of our friends, we republish the article in question, together with a further report on the plant, published in "Tropical Life," by Mr. H. J. Keane, Experts Translating, Alliance, Dulwich.

NEW FIBRE PLANT—THE ZAPUPE.

We are indebted to the courtesy of Mr. W. B. Murray, editor and manager of the "Mexican Investor," for the following particulars concerning a very valuable fibre plant which is indigenous in the Mexican State of Tamaulipas:—

Marked interest has been developed in Mexico during the last year in the hitherto unappreciated fibre produced by the zapupe plant, which has been employed by the Indians for centuries in the manufacture of various articles, such as rope, bags, lariats, bridles, cordage, and seines. The zapupe fibre possesses many advantages over other similar fibres, and its pronounced merit as a commercial article will inevitably render it a source of great wealth to Mexico, where it appears to be indigenous. A tract of land exclusively devoted to its culture and for experimental purposes is now in full bearing, and the results obtained have surpassed the most sanguine expectations.

The zapupe is quite similar in appearance to the henequen plant of Yucatan. The leaves, however, are not so fleshy and are longer. Leaf for leaf, it produces slightly less fibre than the henequen, but the total yield of fibre is greater, owing to the fact that there are double the number of leaves on the zapupe plant, which will yield seventy-five to eighty leaves. Its fibre is white when properly extracted, resistant, and flexible.

Rope made from it does not kink or mildew when exposed to dampness or immersion in water, and will freely run through ship blocks and pulleys, in which respect much difficulty and annoyance have been experienced with inferior fibre. Zapupe will yield the first cutting of leaves three years from the time the young scions are planted, and has a great advantage in this respect over other fibre-producing plants, which, as a rule, attain their period of production in five to seven years. From the first to the third year after beginning to yield it will produce 100 to 110 leaves annually, gradually decreasing to between seventy-five and eighty leaves, and retaining that production consecutively for fifteen years. The fibre extracted will, on an average, be from $2\frac{1}{2}$ to 3 lb. annually for each plant, although in exceptional cases, where the plants have been given special attention, they have produced as high as 4 lb. The leaves may be harvested throughout the year, from twenty to twenty-five leaves being cut every ninety days. If the leaves are not cut regularly, the life of the plant will be materially shortened—at the end of five to seven years it will throw up from the centre a long stem about 8 feet high, and will shortly thereafter cease producing leaves and die. If the leaves are constantly cut, this does not occur until the fifteenth year, and frequently not until the eighteenth year. Branches develop from the summit of the stem, and in time become diminutive zapupe plants, which eventually become detached and are scattered over the ground, where they take root and become strong, vigorous plants. This stem produces from 2,000 to 2,500 of these tiny scions; in addition to this, numerous scions spring from the roots of the stump.

The plant requires but little attention. After the land has been cleared and scions planted, $6\frac{1}{2}$ by $6\frac{1}{2}$ feet apart each way, which permits 1,000 to be planted to an acre, it is necessary only to keep the young plants free from weeds. After the second year little or no cultivation is required, as their shade will check all undergrowth which might be injurious to them. Where vegetation is very rank it may be necessary to give the land a light cleaning once a year to permit labourers to pass freely from plant to plant to cut the leaves. This is a very simple operation, as the labourers are supplied with a long-bladed knife, having a sharp hook-like curve at the end, which is introduced between the stump and the leaf, and with a dexterous upper jerk the leaf is cut off close to the stump. This is essential, as an uneven, ragged stump will deteriorate and often die. After the required number of leaves are gathered and assembled in lots of fifty, the long needle-like apices are cut off and the leaves made up in bundles, tied, and carried to the cleaning-shed, situated so as to be within convenient reach of the plants. The machinery is either of the old plain type, with a capacity of cleaning 3,000 leaves in ten hours, or of the recent modern type, with a capacity of 100,000 leaves in ten hours. The leaves are fed at the receiving table of the machine, and the perfectly cleaned fibre is delivered at the outlet as fast as one man can handle it. The plain machines cost 300 dollars (£60) to 500 dollars (£100) gold, and the large automatic machines from 2,000 dollars (£400) to 3,000 dollars (£600) gold.

A plant one year old will produce fibre within two years. The present cost of such a plant is 3 cents; smaller plants may be had for $1\frac{1}{2}$ cents ($\frac{3}{4}$ d.) apiece. With the cost of labour but 50 cents (2s. 1d.) a day, and the labourer boarding himself, it is estimated that the cost of producing 1 lb. of fibre is from 2 cents (1d.) to $2\frac{1}{2}$ cents ($1\frac{1}{4}$ d.) a lb., delivered on board. As samples have been recently submitted to fibre experts in New York City, who estimated that the price would range from 3 cents (4d.) to 9 cents ($4\frac{1}{2}$ d.) gold, equal to from £37 to £41 13s. per ton, it is evident that, after deducting cost of production, a very handsome profit would be realised.

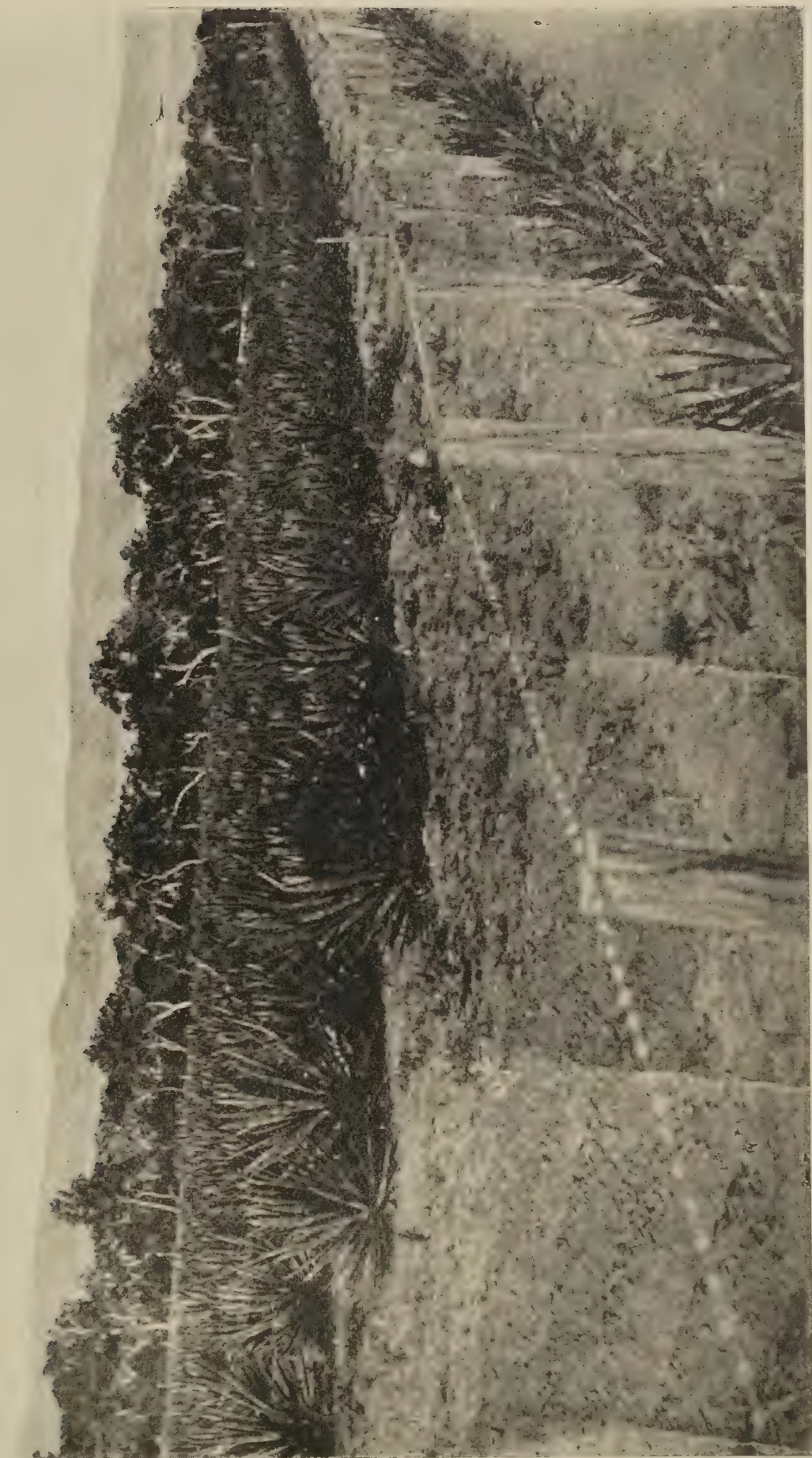
As the plants approach their final leaf production, care is taken to plant young scions between the rows of old plants, so that they will reach maturity as the others die out. The plant is extremely vigorous, as the scions can be removed from the ground, allowed to remain under cover for weeks without the least care, and, when planted, will grow vigorously and suffer no evil effects. The zapupe will thrive in almost any location, and apparently does well on all kinds of soil, but seems to respond quicker in a slightly sandy and rocky environment.

ZAPUPA FIBRE.

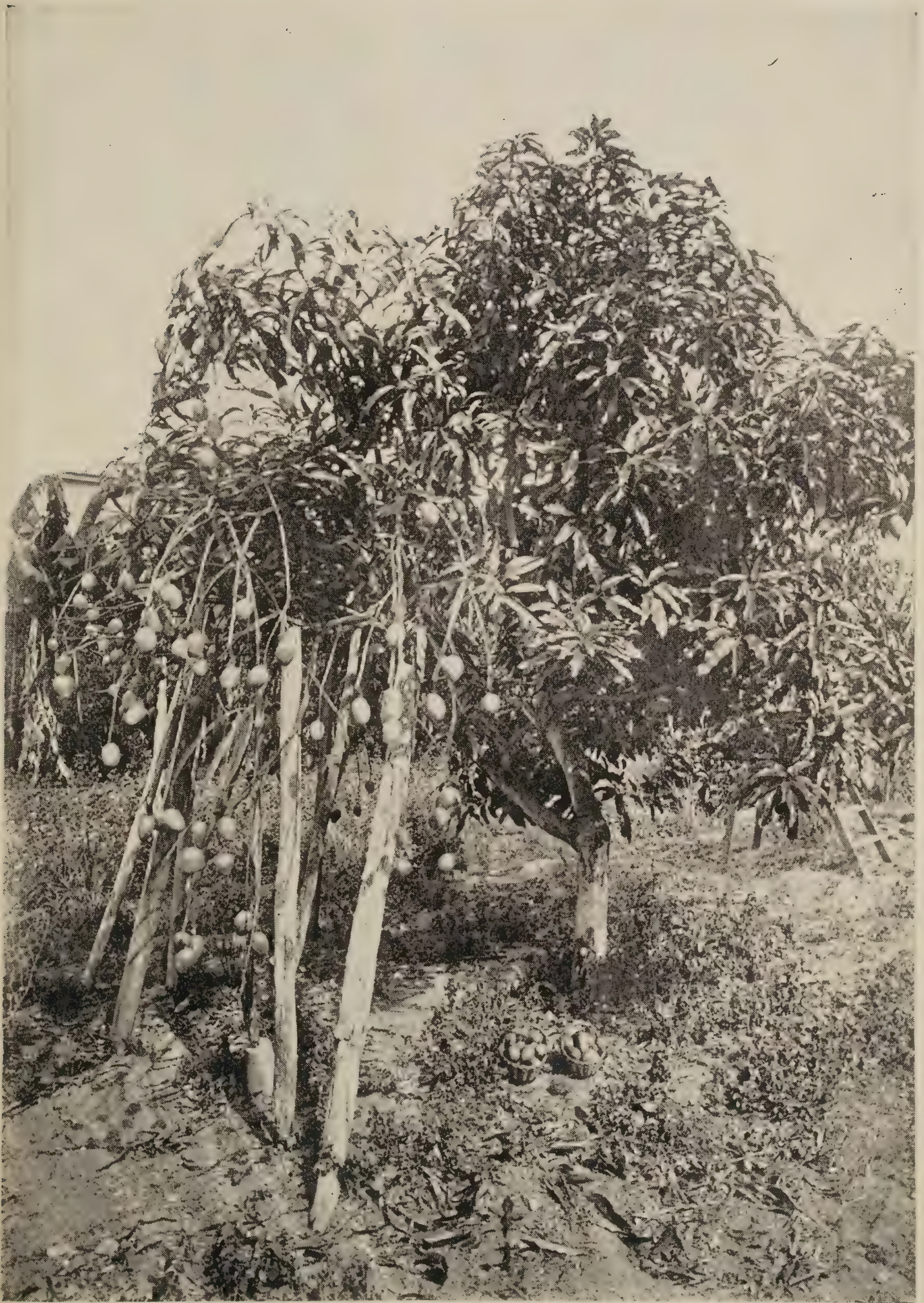
A sample of a new fibre is now being exhibited in the show cases of the Commercial Museum at Brussels, and the following data regarding it have been supplied by the Belgian Legation at Mexico. The zapupa, from which this fibre is obtained, is a variety of agave highly appreciated by the ancient Mexicans, and from which they (like the present-day Indians) obtained a long, white, flexible fibre of great strength, and not subject to decay in water. The zapupa has twice as many leaves as the Yucatan "henequen," and as its fibre is just as good (if not better for certain purposes) it seems to have a great future before it. Besides, "henequen" only produces after five to seven years, whereas the zapupa yields its first crop three years after being transplanted.

The zapupa has only been discovered quite recently, and, so far, it has not been exploited upon a commercial basis. Between the third and sixth year it produces from 100 to 110 leaves yearly, and continues its production for from ten to twelve years, the yield in the last few years being from fifty to seventy-five leaves per annum. As with all the agave, flowering is the sign of senility and approaching death of the plant; however, if some of the leaves be cut annually, the flowering period will be retarded for from twelve to fifteen years. Each plant yields about 2 lb. of fibre annually, value from 15 to 16 centavos.

Plate XI.



SISAL HEMP PLANTATION ON PEEL ISLAND, MORETON BAY.



BUDDED MANGO-TREE GROWN BY MR. McDONNELL, "IVANHOE," YERONGA.

Strong spines protect it from the ravages of cattle, &c. It grows freely in the province of Vera-Cruz, and does best on sunny slopes and sandy soil; shade and moisture are prejudicial to it. It is propagated by means of cuttings, which are taken from the eight to ten months old plant and put into pots; when one year old they are bedded out in the proportion of 2,000 to the acre. They require very little attention, and a crop of leaves may be cut every year. Within, say, four years from planting, a yield of 2,500 kilos. of fibre per acre would be secured, if exploited upon a sound business basis, which would give a profit of 450 fcs. per acre. So far, there is no market price quoted, but the fibre has been valued at New York at from 8 to 9 centavos gold per lb., all expenses paid by the producer. With a capital of 500,000 fcs. from 1,000 to 1,500 hectares of suitable land could be purchased, and 500 put under zapupa; the rest could be used for grazing cattle, erecting buildings (station houses, fibre-making plant, stores, &c.), and at the end of the fourth or fifth year a profit of 225,000 fcs. would be secured on the zapupa fibre alone. One million plants have just been planted out in Tuxpam, and it is hoped that 500,000 will be in full production in about two years. Offers have already been received from two European firms to buy the annual production, but so far no agreement has been definitely entered into, as the growers wish to remain independent if possible.

SISAL HEMP AT PEEL ISLAND.

When Peel Island was devoted to the purposes of a Quarantine Station, it was thought that a portion of the cleared land might be utilised for the purpose of growing vegetables for the inmates of Dunwich Benevolent Asylum, from which it is only a couple of miles distant. The experiment was tried by successive Home Secretaries, but, notwithstanding the apparent richness of the dark sandy loam, all attempts to produce vegetables proved failures. About four years ago sisal hemp was planted, and this has evidently found a congenial home. The original area of about 4 acres has grown with great rapidity, and has long been ready for harvesting. We believe there are now about 16 acres planted but, if nothing is done to utilise the leaves, the plants will flower and the leaves will then be useless. It only needs to recall what has been done in the way of obtaining fibre from a single acre of plants at St. Helena, to realise what could be obtained from the area ready for harvesting at Peel Island.

A FINE YOUNG MANGO TREE.

Our illustration depicts a very well-grown mango tree, grown by Mr. McDonnell, Ivanhoe, Yeronga. Mr. McDonnell budded the tree three years ago, and it bore fruit two years afterwards—in the third year. Already 2½ dozen fine fruits have been gathered, and the tree is still laden with fruit. After budding, the bud took some time to strike. The operation was performed as described by Mr. Benson—that is to say, the bud was taken with a square piece of bark attached, and accurately fitted to a space on the young tree from which a similar piece of bark had been removed. The fruit is of fair size, scarlet on one side, and slightly acid in flavour, with scarcely any fibre.

GENERAL INDEX.

A general index to the first nineteen volumes of the "Queensland Agricultural Journal" will be issued during the month. The index is so arranged that each title of an article, which will admit of it, is indexed under different headings. The illustrations, as also the excellent articles on the Flora of Queensland and New Guinea by Mr. F. M. Bailey, Colonial Botanist, are indexed separately. The index will be supplied at 1s. per copy.

Bacteriology.

EPIZOOTIC DISEASE IN DUCKS.

By C. J. POUND, Director of the Bacteriological Institute, Brisbane.

INFECTIOUS LEUKEMIA.

In a report on the subject of epizootic disease in ducks, to the Under Secretary for Agriculture and Stock, Mr. Pound says that the disease, if not new to Queensland, has not been described as existing here before. Following is a detail of the symptoms of the disease, inquiry into which is now being made by Mr. M. Fern, Poultry Expert to the Department:—

INTRODUCTION.—During the past twelve years I have had occasion to inquire into many destructive diseases occurring amongst poultry, particularly fowls and ducks. These outbreaks were shown, after careful bacteriological examination, to be either chicken cholera (Pasteur) or fowl enteritis (Klein). Quite recently, however, there came under notice an outbreak of disease, quite distinct from the above and occurring among ducks only, causing a mortality of over 60 per cent.

HISTORY OF THE OUTBREAK.—A gentleman at Red Hill informed me that the disease made its appearance very suddenly. At first he noticed about a dozen of young ducks looking very sick and refusing food, and, within three or four days, many of them were either dead or in a dying condition. The next day some of the older ducks became infected, as many as twelve being found dead at one time. After about fifty ducks had died, I was asked, at the suggestion of Mr. Fern, the Poultry Expert, to inquire into the matter. Having ascertained that the disease was of a bacteriological origin and of an infectious character, several recommendations were made with regard to its suppression—viz., complete isolation and segregation of all diseased or suspected birds, and thorough disinfection of the yards, feeding and drinking vessels.

NATURE OF THE DISEASE.—The disease runs a course of from seven to fourteen days. After an incubation period, which may last from three to five days, the birds show the first symptoms of the disease—viz., drooping wings and acute diarrhoea, with greenish mucoid evacuations. They become drowsy and somnolent, with their heads hanging down, and, refusing food, get gradually weaker and die. Owing to the infectious nature of the disease and the ready way in which the red corpuscles are destroyed, it has been named "Infectious Leukemia," at the suggestion of Veranus Moore, who first investigated various outbreaks of the disease in the United States.

HOW THE INFECTION IS SPREAD.—Like chicken cholera and fowl enteritis, this malady spreads precisely in the same manner. When once the disease has become established, the droppings of the birds contain the specific organism in large numbers, thereby favouring the contamination of the food, grit, and water taken by healthy birds that are enclosed in the same run. It is, therefore, easy to understand how readily the disease assumes epizootic proportions.

The disease may be carried from one yard to another by the agency of sparrows, or by the person who attends to the poultry taking infectious matter into a healthy yard on his or her shoes. It is also quite possible that the wind, in a minor degree, may be responsible for carrying the disease germs on dirt, leaves, or small pieces of wood over considerable distances, and so creating new centres of infection.

There can be little doubt that in many poultry runs the principal factor in the propagation of the disease is the want of good sanitary conditions, particularly in respect to the environment of food supply and water.

NATURE OF THE MICRO-ORGANISM.—The micro-organism which gives rise to this disease is a non-motile bacterium—really a short rod with rounded ends, and is a little more than 1.6 microns long and about 1 micron broad. In stained preparations from the heart blood they appear singly, in small clumps, and sometimes in pairs. They stain readily with fuchsine, gentian violet, and methylene blue, but are decolourised by Gram's method. In smear preparations from a diseased bird or from a young culture, the bacteria, as a rule, stain uniformly. In many, however, there is tendency to show bi-polar staining. The latter feature can be well brought out by placing the freshly prepared smear, after drying, in a watchglassful of 5 per cent. carbolic acid for three minutes and then transferring it direct to methylene blue for about five minutes, afterwards washing, drying, and mounting in neutral Canada balsam. Specimens so prepared show the organisms with deeply stained and sharply defined poles, leaving the central portions perfectly clear.

GROWTH ON CULTURE MEDIA.—The bacteria grow well in beef broth, causing general turbidity within twenty-four hours. Eventually a whitish granular sediment settles at the bottom, leaving the upper portion of the broth perfectly clear.

On ordinary agar the growth is not very rapid. The surfaces of the small white colonies are convex, with sharply defined margins. If anything, the growth is more prominent than that of chicken cholera.

In glucose media there is no development of gas.

On gelatine the colonies are very much smaller than on agar, and there is no liquefaction of the media.

TEMPERATURE REQUIREMENTS.—The organisms grow well at both room and incubator temperatures.

VITALITY.—Attenuation is readily produced on culture media. Moreover, unless subcultures are frequently made the organisms will die out altogether.

EFFECTS OF DESICCATION.—The bacteria readily succumb to the effects of desiccation. The organisms from broth culture or infected blood smeared on glass will only remain alive for about ten days.

EFFECTS OF SUNLIGHT.—Exposure to the direct rays of the sun will completely destroy the bacteria within ten minutes.

EFFECTS OF DISINFECTANTS.—A 1 in 100 solution of carbolic acid destroys the bacteria in active virulent cultures in five minutes, while 1 in 1,000 solution of Cyllin disinfectant produces the same effect in the same time, showing that it possesses ten times the germicidal efficiency of carbolic acid.

POST-MORTEM APPEARANCES.—The feathers of the cloaca are slightly soiled a yellowish-green with the diarrhoeal discharges. The flesh throughout the body has a distinct anæmic appearance. The lungs, lymphatic glands, and spleen are apparently normal. The liver is usually enlarged, dark-coloured, and slightly friable. Occasionally a few grey spots resembling miliary tubercles are present. The kidney is very light in colour, with marked injection of the blood-vessels. The heart is very pale, as though all the blood had been squeezed out of the muscular tissue of the ventricles. Very little blood, which is invariably very thin, is found inside the heart. The general anæmic condition of the whole of the body demonstrates that the most important change is to be found in the blood. This consists of a marked diminution in the number of red blood corpuscles, as shown by continued microscopical examination of the blood during the progress of the disease. With a decrease of the red cells there is a correspondingly apparent increase of the white cells or leucocytes.

ANIMAL EXPERIMENTS.—Before specimens of diseased birds could be obtained for investigation the disease had become somewhat attenuated, and the epizootic was declining, consequently the experimental animals (mice, guinea-pigs, rabbits, fowls, and ducks) only suffered from a local reaction, no cases proving fatal. Moore remarks, from his observations, that, although the disease is fatal to each of the animals above mentioned, comparatively large quantities of the virus are required to produce fatal results. In his experiments on fowls he states that where more than two fowls were fed upon infected viscera or pure culture one or more remained well. Several survived the feeding of large quantities (300 to 500 c.c.) of pure bouillon culture. And, again, the subcutaneous injection of pure cultures gave uncertain results. In a few fowls fatal results were obtained, but usually they remained unchanged after this treatment.

TREATMENT AND PREVENTION.—Owing to the nature of the disease it is almost impossible to prescribe a medical remedy. It has, however, been suggested by some observers, when dealing with diseases of similar characters, to administer quinine sulphate in 1 to 2 grain doses, and in addition to place 1 per cent. of iron sulphate in the drinking water. Both sick and healthy birds should have a liberal supply of food and fresh water, and care should be taken that the poultry yards and houses are well ventilated.

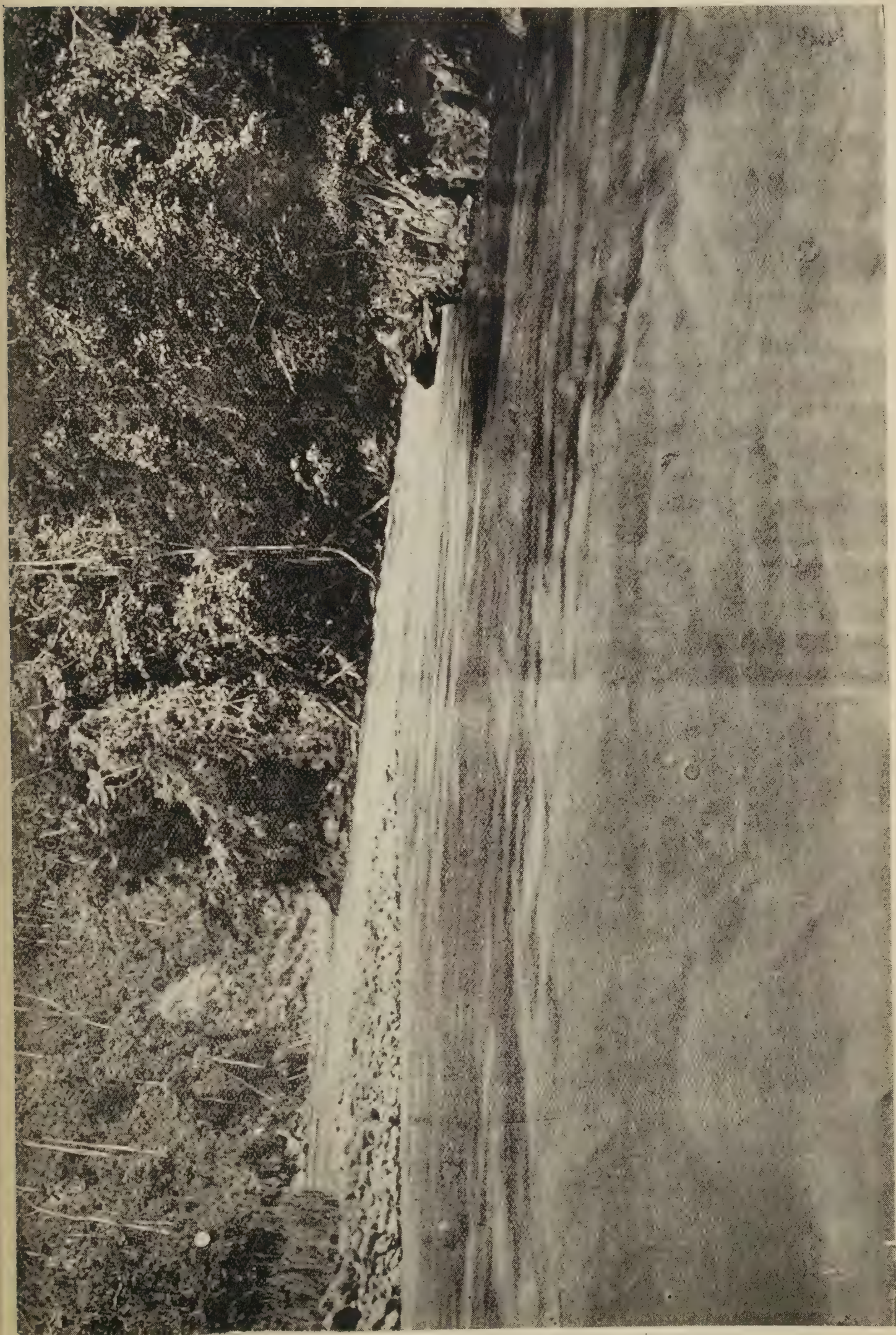
The perches, coops, nesting-houses, and the interior of all poultry-houses should be thoroughly brushed over with a 1 in 500 Cyllin solution, and afterwards treated with freshly-prepared lime wash. Feeding troughs and drinking vessels should be scalded, then treated with Cyllin solution, and afterwards exposed to the direct sun's rays for several days.

Isolation and segregation are absolutely necessary in preventing the spread of the disease. Those birds that are apparently unaffected should be separated from the sick ones, and placed right away in a fresh, clean enclosure. The ground of the infected enclosure should be continually raked over and thoroughly mixed with dry lime, and no birds allowed to run over it for at least a fortnight.

Of special interest is the fact that this disease is not so dangerous as fowl cholera, as very large quantities of the specific organisms are necessary to set up fresh centres of infection; whereas, with fowl cholera a very few organisms, introduced either by injection or inoculation, will produce a fatal form of disease. It is highly probable that many outbreaks of infectious leukemia are mistaken for fowl cholera, and no doubt large numbers of birds die annually from the disease, which might otherwise be prevented, provided the poultry farmers with united efforts removed those unfavourable conditions which assist in the spread of all infectious maladies. It is, therefore, necessary to provide pure water and good wholesome food for the birds, and keep their houses and yards in as perfect a sanitary condition as possible.

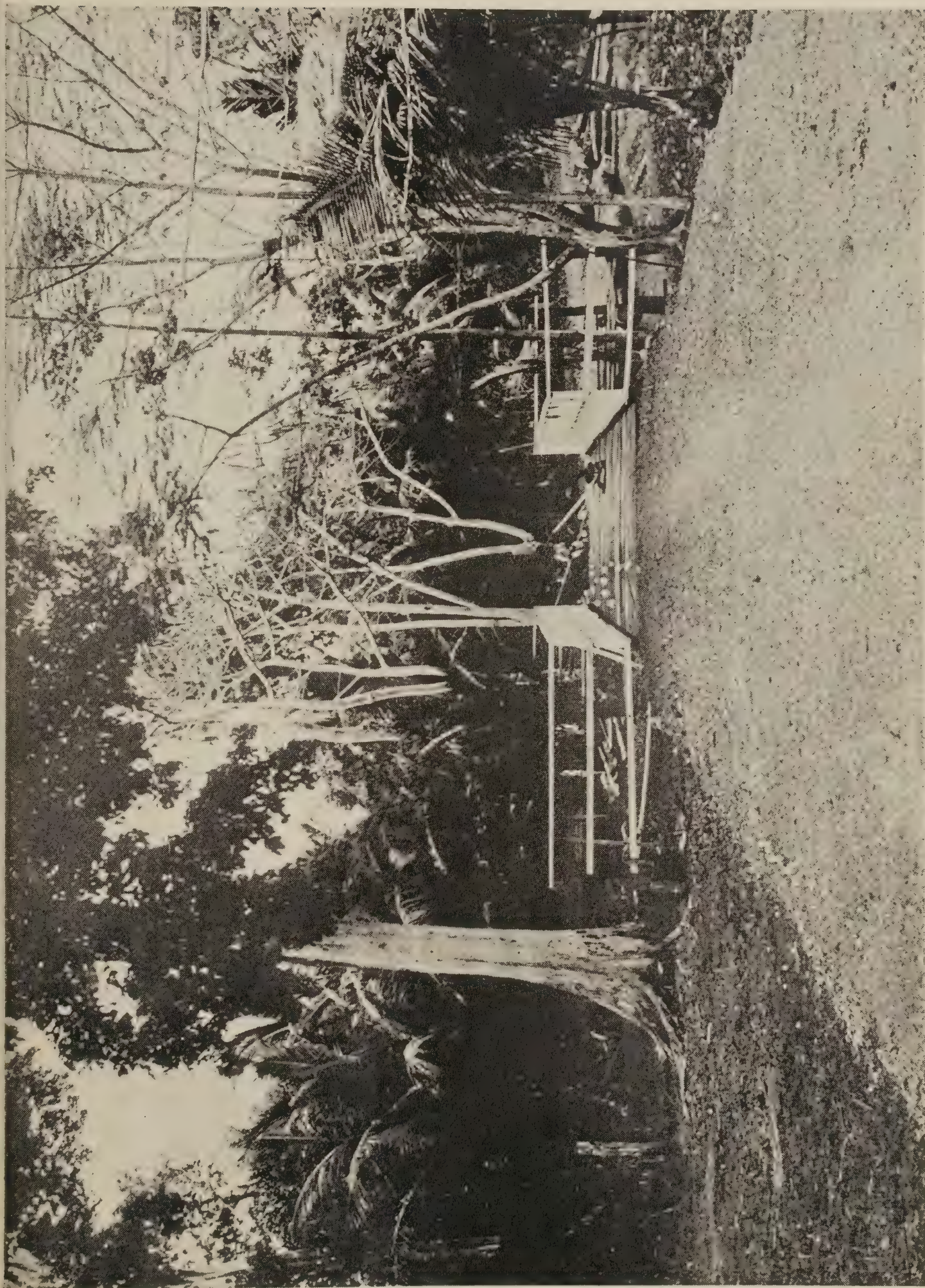
LAND IN NEW GUINEA.

The accompanying illustrations give a very fair idea of the unimproved scrub lands of that part of New Guinea lying about 30 miles eastward of Port Moresby, the capital. The road scene is on the rubber plantation belonging to Mr. A. C. English (for many years a magistrate in the possession), at Barodabo. The bridges, of which there are six on a well-made road 3 miles long, were built entirely by native labour, under Mr. English's supervision, and would do credit to a Queensland contractor. The second view is a scene on the Kemp Walsh River, in the same neighbourhood. From the appearance of the rushing water of the river, this would appear to be ideal country for the use of water power.



VIRGIN SCRUB LAND ON THE KEMP-WALSH RIVER, PAPUA.

Plate XIV.



VIEW ON MR. ENGLISH'S PLANTATION, "BARODABO," PAPUA.

Statistics.

COMMONWEALTH METEOROLOGY.

RAINFALL OF QUEENSLAND.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

STATIONS.	1907.												1908.
	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.
<i>North.</i>													
Bowen	2.53	3.74	1.97	0.39	3.46	2.87	Nil	1.23	0.51	0.06	3.71	6.39	10.14
Cairns	18.36	11.49	3.26	3.35	8.65	4.45	0.12	0.39	1.35	0.68	5.35	28.33	27.02
Geraldton	29.58	25.26	4.58	6.08	21.91	8.54	2.39	4.66	1.36	1.42	6.45	33.82	44.39
Herberton	10.56	11.77	2.05	0.90	1.57	2.71	Nil	0.11	0.12	0.17	3.41	9.57	9.29
Hughenden	1.98	3.83	1.17	0.16	1.34	0.95	1.16	Nil	Nil	1.66	0.66	7.75	0.98
Kamerunga State Nurs.	15.78	14.82	4.87	2.80	9.33	5.29	0.13	1.15	1.19	0.53	2.76	29.82	...
Longreach	1.22	0.49	1.88	0.85	0.93	0.40	0.49	0.04	Nil	1.08	2.83	9.12	Nil
Lucinda	12.38	23.82	4.53	3.92	19.29	6.34	0.29	1.05	1.19	0.25	0.43	23.38	25.93
Mackay	2.72	6.42	8.01	1.58	6.09	5.04	0.27	0.25	0.12	0.12	5.76	9.70	9.28
Rockhampton	4.15	4.42	3.05	0.44	0.94	4.16	0.84	0.47	Nil	0.47	3.72	4.42	3.84
Townsville	12.49	7.75	7.37	1.03	3.11	2.38	Nil	0.07	0.14	0.03	2.82	24.26	12.21
<i>South.</i>													
Barcaldine	3.44	0.43	1.51	0.82	0.34	2.03	0.87	0.06	Nil	1.21	1.54	11.74	Nil
Beenleigh	4.75	3.88	4.17	0.58	4.70	4.92	0.71	0.58	Nil	1.73	2.81	4.48	2.41
Biggenden State Farm	5.77	3.55	10.91	0.34	4.02	5.24	1.51	0.96	0.24	1.99	2.50	5.55	...
Blackall	2.30	Nil	2.78	1.69	0.20	0.36	1.36	0.06	Nil	0.88	0.80	7.47	0.63
Brisbane	2.69	5.23	5.32	0.45	4.75	2.91	0.39	0.79	0.10	1.37	4.25	3.21	2.80
Bundaberg	3.29	3.90	12.81	0.38	3.08	4.49	0.87	0.43	Nil	1.70	2.90	2.99	4.77
Caboolture	2.53	8.03	9.04	0.78	3.10	4.98	0.73	0.32	0.13	2.09	4.15	3.18	9.36
Charleville	0.85	Nil	2.75	2.29	0.26	0.90	1.04	0.76	0.02	1.69	3.88	4.09	0.32
Dalby	5.60	1.34	3.72	0.20	2.26	2.35	0.87	0.71	0.15	0.69	5.18	1.44	0.17
Emerald	7.36	3.67	7.66	Nil	Nil	2.53	1.75	0.10	Nil	0.98	1.84	6.70	0.49
Esk	2.87	6.79	3.60	0.22	5.42	2.66	0.54	0.81	0.57	0.50	3.76	3.72	2.61
Gatton Agric. College	2.62	6.44	2.71	Nil	2.80	1.85	0.54	0.56	0.15	0.71	3.01	4.55	...
Gayndah	3.00	1.91	6.89	Nil	2.65	3.00	1.21	0.53	0.40	0.34	4.65	6.84	1.22
Gindie State Farm ...	6.13	0.71	10.10	Nil	Nil	2.29	1.58	0.10	0.16	0.61	1.57	4.42	0.20
Goondiwindi	5.37	1.77	6.51	0.33	1.30	1.09	1.62	0.95	0.12	1.13	2.91	3.71	1.22
Gympie	3.99	6.96	8.93	1.12	3.84	3.77	0.80	0.17	0.47	1.20	3.05	5.49	6.26
Ipswich	2.17	5.38	1.95	0.12	3.43	2.22	0.30	0.43	0.05	0.78	4.45	3.40	1.32
Laidley	2.84	4.50	3.47	Nil	2.99	1.56	0.45	0.58	0.15	0.87	1.97	2.72	1.61
Maryborough	5.52	7.84	10.28	1.25	3.21	6.05	0.64	0.93	0.25	2.74	3.49	5.81	5.62
Nambour	5.74	12.05	13.30	1.36	4.54	6.96	1.08	1.13	0.60	1.38	2.98	4.76	9.29
Nerang	9.86	6.04	7.83	1.48	7.54	5.08	1.26	1.35	0.05	0.86	3.88	4.51	3.83
Roma	6.32	2.92	1.87	0.42	0.27	2.47	1.03	0.42	0.04	1.04	3.70	2.51	0.04
Stanthorpe	4.33	3.30	5.98	1.68	1.79	2.44	1.06	1.65	0.13	1.30	5.03	3.46	0.60
Tambo	4.74	1.41	3.58	3.69	0.11	0.89	1.42	0.09	Nil	0.68	2.03	7.20	0.36
Taroom	5.16	1.10	1.86	Nil	1.01	3.76	0.70	0.04	0.10	0.67	6.82	3.79	0.20
Tewantin	6.38	15.83	11.45	1.87	7.16	7.61	1.48	0.95	0.55	1.05	3.12	7.36	10.42
Texas	4.69	4.55	6.16	0.65	0.93	1.62	1.31	0.87	0.07	1.83	2.78	2.15	1.57
Toowoomba	3.94	4.00	4.81	0.01	4.61	3.34	0.91	0.65	0.17	1.58	5.12	2.81	1.16
Warwick	3.95	2.52	5.71	0.51	1.58	1.27	1.16	1.37	0.01	1.37	3.25	3.13	0.76
Westbrook State Farm	1.79	2.91	5.13	0.02	2.53	2.53	1.04	1.78	Nil	1.08	4.76	3.23	...

NOTE.—The rainfall data in this table are compiled from telegraphic reports, and must be considered approximate only.

GEORGE G. BOND,
Divisional Officer.

It will be observed that figures for the following stations have been omitted, viz.:—Kamerunga, Biggenden, Gatton College, and Westbrook. Mr. G. E. Bond, Divisional Officer of the Meteorological Bureau, No. 3 Division, Queensland, says that the reason for this is that, on the 1st of January last, the Queensland Weather Service passed to the control of the Commonwealth Government, and, under the new system, monthly returns of observations are sent direct to the Commonwealth Meteorologist in Melbourne. All the office here has to work upon now is telegraphic information, and no reports by wire are received from the places named. The difficulty has been represented to the Department of Agriculture and Stock, and will, if possible, be overcome as speedily as possible.

Times of Sunrise and Sunset at Brisbane, 1908.

DATE.	JANUARY.		FEBRUARY.		MARCH.		APRIL.		PHASES OF THE MOON.
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	
1	4.56	6.45	5.20	6.42	5.41	6.20	5.57	5.46	4 Jan. ● New Moon 7 43 a.m. 10 „ ☾ First Quarter 11 53 p.m. 18 „ ○ Full Moon 11 37 „ 27 „ ☾ Last Quarter 1 1 a.m. 2 Feb. ● New Moon 6 36 p.m. 9 „ ☾ First Quarter 2 27 „ 17 „ ○ Full Moon 7 5 „ 25 „ ☾ Last Quarter 1 24 „ 3 Mar. ● New Moon 4 57 a.m. 10 „ ☾ First Quarter 7 42 „ 18 „ ○ Full Moon 0 28 p.m. 25 „ ☾ Last Quarter 10 32 „ 1 Apr. ● New Moon 3 2 p.m. 9 „ ☾ First Quarter 2 32 a.m. 17 „ ○ Full Moon 2 55 „ 24 „ ☾ Last Quarter 5 7 „
2	4.57	6.46	5.21	6.42	5.41	6.19	5.58	5.45	
3	4.58	6.46	5.22	6.41	5.42	6.18	5.58	5.44	
4	4.58	6.46	5.23	6.41	5.43	6.17	5.59	5.43	
5	4.59	6.46	5.23	6.40	5.43	6.16	6.0	5.41	
6	5.0	6.47	5.24	6.40	5.44	6.15	6.0	5.40	
7	5.0	6.47	5.25	6.39	5.44	6.14	6.1	5.39	
8	5.1	6.47	5.26	6.38	5.45	6.13	6.1	5.38	
9	5.2	6.47	5.26	6.38	5.45	6.11	6.2	5.37	2 Feb. ● New Moon 6 36 p.m. 9 „ ☾ First Quarter 2 27 „ 17 „ ○ Full Moon 7 5 „ 25 „ ☾ Last Quarter 1 24 „ 3 Mar. ● New Moon 4 57 a.m. 10 „ ☾ First Quarter 7 42 „ 18 „ ○ Full Moon 0 28 p.m. 25 „ ☾ Last Quarter 10 32 „ 1 Apr. ● New Moon 3 2 p.m. 9 „ ☾ First Quarter 2 32 a.m. 17 „ ○ Full Moon 2 55 „ 24 „ ☾ Last Quarter 5 7 „
10	5.2	6.47	5.27	6.37	5.46	6.10	6.2	5.36	
11	5.3	6.47	5.28	6.36	5.46	6.9	6.3	5.35	
12	5.4	6.47	5.29	6.36	5.47	6.8	6.3	5.34	
13	5.5	6.47	5.29	6.35	5.47	6.7	6.4	5.33	
14	5.6	6.47	5.30	6.34	5.48	6.6	6.4	5.32	
15	5.6	6.47	5.31	6.33	5.49	6.5	6.5	5.31	
16	5.7	6.47	5.31	6.33	5.49	6.4	6.5	5.30	
17	5.8	6.47	5.32	6.32	5.50	6.3	6.6	5.29	3 Mar. ● New Moon 4 57 a.m. 10 „ ☾ First Quarter 7 42 „ 18 „ ○ Full Moon 0 28 p.m. 25 „ ☾ Last Quarter 10 32 „ 1 Apr. ● New Moon 3 2 p.m. 9 „ ☾ First Quarter 2 32 a.m. 17 „ ○ Full Moon 2 55 „ 24 „ ☾ Last Quarter 5 7 „
18	5.9	6.47	5.33	6.31	5.50	6.2	6.6	5.28	
19	5.10	6.47	5.34	6.30	5.51	6.1	6.7	5.27	
20	5.10	6.47	5.34	6.29	5.52	5.59	6.7	5.26	
21	5.11	6.46	5.35	6.28	5.52	5.58	6.8	5.25	
22	5.12	6.46	5.36	6.28	5.53	5.57	6.8	5.24	
23	5.13	6.46	5.36	6.27	5.53	5.56	6.9	5.23	
24	5.14	6.46	5.37	6.26	5.54	5.55	6.9	5.22	
25	5.14	6.45	5.38	6.25	5.54	5.54	6.10	5.21	1 Apr. ● New Moon 3 2 p.m. 9 „ ☾ First Quarter 2 32 a.m. 17 „ ○ Full Moon 2 55 „ 24 „ ☾ Last Quarter 5 7 „
26	5.15	6.45	5.38	6.24	5.54	5.53	6.11	5.20	
27	5.16	6.45	5.39	6.23	5.55	5.52	6.11	5.20	
28	5.17	6.44	5.39	6.22	5.55	5.50	6.12	5.19	
29	5.18	6.44	5.40	6.21	5.56	5.49	6.12	5.18	
30	5.19	6.43	...	...	5.56	5.48	6.13	5.17	
31	5.19	6.43	...	...	5.57	5.47	...	...	

Publication Received.

"THE NEW ZEALAND TOWN AND COUNTRY LIFE."

We are in receipt of "New Zealand Town and Country Life," the new issue of the "Farmers' Weekly and Land Agents' Record." Considerable changes have been made in the appearance of the paper, the columns gain an additional 2 inches in depth and another four pages have been added to the paper, which now consists of thirty-six pages and cover. The additional space is largely utilised for the publication of matters of more general interest than are usually found in a paper devoted exclusively to farming matters. Under the heading of "Men Worth Knowing," a very interesting sketch of Sir John Logan Campbell, "The Father of Auckland," appears with a full-page portrait of the veteran-settler in his 91st year, specially taken for the journal. The personal element (always an interesting one) is further catered for under the heading of "In Personal Touch," which deals in anecdotal fashion with the experiences of well-known gentlemen. Under the heading of "The Outlook," matters of current moment are discussed in more or less racy fashion. "Labour's Demands upon the Farmer" are treated editorially under the heading of "The Common-sense View," and other new features of general interest are dealt with in the special columns devoted to the "World of Recreation" and "Mining and Finance." A specially illustrated article gives the reader a peep behind the scenes at the Pollard Juvenile Opera Company, and the Potato Harvest is dealt with in similar fashion. The illustrations are topical in character, and, as all the old farming features of the paper are retained, while the magazine and news sections are considerably strengthened, the paper should gain considerably in support from the reading public.

Answers to Correspondents.

THE COTTON BOUNTY.

JAS. WRIGHT, Don River, Bowen.—

Although the Bounties Bill was passed in the Federal Parliament in November last, no regulations in connection therewith have yet been issued. You may, therefore, either plant cotton next August, by which time regulations will doubtless have been issued, or, if you want the bonus on cotton grown this season, you must await the issue of regulations.

Since the above was written, we learn that the draft regulations have at last been framed. The bounty will be paid on each 2 tons of ginned cotton sent to market. This means that the proprietors of ginning establishments should be able to give a higher price for seed cotton than was paid last year. See the "Brisbane Courier" for 22nd February for further information.

LEAF-BLAST OF SISAL HEMP.

J. HAMILTON, Solomon Islands.—

You need have no fear of the leaf-blast doing permanent injury to a sisal plantation.

About thirty years ago in Mexico a great scare was created by the appearance of what looked like a disease in the leaves of sisal plants. Scientific investigation, however, clearly proved that the red and yellow patches on the leaves were not due to fungoid or insect disease, but to the effects of sudden great heat occurring after long-continued cold rains. When this "leaf-blast" is noticed, the affected leaves should be at once put through the decorticating machine, as the fibre is not injured. The leaf-blast has occurred in the Brisbane Botanic Gardens, at St. Helena, at Peel Island, and also in the North during the past year. At St. Helena the fibre-extracting machines were at work, so that no loss was sustained. The blast disappeared almost as rapidly as it had shown itself, and the health of the plants was not in the least injured. It is noticeable that the leaf-blast is liable to occur at very long intervals, where the plants are growing in rich soil. Those planted on poor and rocky soils gave no indication of the trouble. Intending planters need not hesitate to plant suckers on which the leaf-blast is visible, as it will not affect the growth or health of the plants in the least.

GROWING SWEET POTATOES.

F. LEISHMAN, Blackall Range.—

It is almost incredible that, after over fifty years' experience in growing sweet potatoes, there should yet be doubt as to the method of planting in order to obtain the best result. The usually adopted plan is to throw up the land in ridges about 4 feet apart from centre to centre. The crown of the ridge is opened, and cuttings from the vines are planted in the furrow. These cuttings may be from 10 to 12 inches in length. They soon take root, and, before long, cover the whole intervening spaces with a mass of runners. But it sometimes happens that the luxuriant growth of vines is produced at the expense of the tubers. This trouble is easily avoided by cutting back the vines and hilling up the drills afresh, or by twisting up the vines in a heap on top of the roots. Another plan is to turn the vines over from one side to the other of the row about once a fortnight. By so doing, all the tubers become fully developed.

SEED CORN.

M. REED, Warra.—

It has always been the custom with maize-growers to select the large flat grains for seed. There can be no doubt that if the round grains are sown the crop will turn out a poor one—the cobs produced on plants grown from such seed will never fill out properly. There is, however, one point in connection with seed corn which is perhaps not generally known, and that is, that the largest grains do not necessarily produce the largest plants. The size of the germ within the seed bears no relation to the size of the grain. Of course, it can well be understood that the larger the seed the more food material there is to enable the plant to resist adverse influences, and to enable the embryo plant to push its way up from a depth which would be fatal to a weaker germ. Small seeds often contain larger and stronger germs than large seeds.

DISEASE IN POULTRY.

POULTRY FARMER, Kinkora.—

Mr. M. Fern, Instructor in Poultry Breeding to the Department of Agriculture and Stock, gives the following opinion concerning the trouble with your poultry, based on the symptoms you describe:—

From the few particulars forwarded, I should say your birds are suffering from debility or anaemia, and when in such a condition fall a prey to any disease that may be going about. The cause is very hard to define. It may be from want of air or sunshine, errors in feeding, inbreeding, or hereditary.

Treatment: Find the cause and remove it. Isolate all sick birds, and destroy same, as they will be useless as breeders. Remove droppings regularly; allow sun to penetrate the houses; provide clean cool drinking water—a tonic in the form of a little tincture of iron in drinking water, a teaspoonful to a quart of water.

We should be glad if you could forward a bird (alive) suffering as you describe. It is very hard to say definitely what disease a bird is suffering unless full particulars are given of mode of feeding and other particulars that escape the ordinary observer. By an examination of the bird a diagnosis of the disease would be more certain.

SOOT AS A MANURE.

F. W. IRONMONGER, Pine Mountain.—

In reply to your question, Mr. J. C. Brünnich, Agricultural Chemist, says:—

Soot has a manurial value on account of containing about 3 per cent. of nitrogen, and also small amounts of potash and phosphoric acid. It may be used as a top dressing for grass and grain crops.

Boiler flue ashes have also a manurial value, as they contain appreciable amounts of potash and lime, varying in accordance with the kind of fuel burnt.

Basic slag or Thomas phosphate is a by-product of steel works, and is valuable as manure on account of the large amount of phosphoric acid it contains combined with lime. The phosphoric acid is not in so soluble a form as in superphosphate, but still is readily available. It may be applied at the rate of 1 to 3 cwt. per acre.

TREATMENT OF MOTHERLESS FOAL.

S.C., Sandy Creek, Mackay.—

(1) Cow's milk, with the addition of rain water in the proportion of 9 parts of milk to 1 of water, is the best food on which to rear a foal artificially. The animal should be fed three or four times a day. Care should be taken that the milk is fresh, that the cows supplying it are healthy, and that the vessels containing it are thoroughly clean.

(2) *Light Manures*.—Yes, the address given is sufficient.

The Markets.

PRICES FOR FRUIT—ROMA-STREET MARKETS.

Article.	JANUARY.					
	Prices.					
Apples, Imported, per packer	...	...	...	...	...	18s. 6d.
Apples, New England, per packer	...	...	...	...	...	4s. to 10s.
Apples, Tasmanian, Cooking	...	...	...	...	...	...
Apricots, Local, per packer	...	...	...	...	...	...
Bananas, Fiji, per case	...	...	...	...	...	13s. to 13s. 6d.
Bananas, Fiji, per bunch	...	...	...	...	...	3s. 6d. to 7s.
Bananas, Queensland, per case	...	...	...	...	...	12s. to 13s.
Bananas, Queensland, per bunch... ..	...	...	...	...	...	2s. 6d. to 5s.
Cherries, per quarter-case	...	...	...	...	...	...
Cocoanuts, per bag... ..	...	...	...	...	...	11s. to 12s. 6d.
Custard Apples, per quarter-case	...	...	...	...	...	6s. to 7s.
Grapes (black), per box	...	...	...	...	...	1s. 6d. to 4s.
Grapes (white), per box	...	...	...	...	...	1s. to 3s. 6d.
Grapes (muscatel), per box	...	...	...	...	...	3s. to 7s.
Lemons (white)	...	...	...	...	...	3s. to 10s.
Mangoes, Queensland, per packer	...	...	...	...	...	5s. to 6s.
Nectarines, per box	...	...	...	...	...	2s. 6d. to 10s.
Oranges, Imported, per case	...	...	...	...	...	22s. 6d.
Passion Fruit (Local), choice, per half-case	...	...	...	...	...	4s. 6d. to 5s.
Passion Fruit, medium, per half-case	...	...	...	...	...	3s. to 3s. 6d.
Passion Fruit, small, per half-case	...	...	...	...	...	1s. 6d. to 2s. 6d.
Pears, per quarter-case	...	...	...	...	...	10s. to 12s.
Peaches, per quarter-case	...	...	...	...	...	3s. to 5s.
Peanuts, per lb.	...	...	...	...	...	...
Persimmons, per case	...	...	...	...	...	...
Pineapples (Queensland), Queen, per case	...	...	...	...	...	5s. to 6s. 6d.
Pineapples, common, choice, per case	...	...	...	...	...	3s. 6d. to 4s. 6d.
Pineapples, medium, per case	...	...	...	...	...	2s. 6d. to 3s.
Rockmelons, Local, per gin case	...	...	...	...	...	4s. to 5s. 6d.
Tomatoes, Local, per box	...	...	...	...	...	2s. 6d. to 4s. 6d.
Watermelons, Local (large), per dozen	...	...	...	...	...	7s. to 9s.
Watermelons (medium), per dozen	...	...	...	...	...	5s. to 6s.
Watermelons (small), per dozen	...	...	...	...	...	3s. to 4s.

SOUTHERN FRUIT MARKET.

Bananas, Fiji, per case	...	...	...	...	...	10s. 6d. to 11s. 6d.
" " per bunch	...	...	...	...	...	3s. to 3s. 6d.
" Queensland, per case	...	...	...	...	...	9s. 6d. to 10s.
" " per bunch... ..	...	...	...	...	...	2s. 6d. to 5s.
Cocoanuts, per bag... ..	...	...	...	...	...	11s. to 12s. 6d.
Lemons (choice coloured), per case	...	...	...	...	...	10s. to 12s.
" (good), per gin case	...	...	...	...	...	7s. to 8s.
" (rough), per gin case	...	...	...	...	...	4s. to 5s.
" (Italian), per case	...	...	...	...	...	12s. to 13.
" (American), per case	...	...	...	...	...	17s. 6d.
Mangoes, Queensland, per case	...	...	...	...	...	5s. to 6s.
Oranges, Italian, per case	...	...	...	...	...	21s.
Oranges, Washington Navel, per case	...	...	...	...	...	16s. to 18s.
Oranges, common, choice, per case	...	...	...	...	...	3s. 6d. to 4s.
Oranges, medium, per case	...	...	...	...	...	2s. 6d. to 3s.
Passion Fruit, per quarter-case	...	...	...	...	...	4s.
Pineapples, Queensland (Queens)	...	...	...	...	...	5s. to 6s. 6d.
Peanuts, per quarter-case	...	...	...	...	...	11d. to 1s.
Rockmelons, per double case	...	...	...	...	...	5s. to 6s.
Tomatoes, per quarter-case	...	...	...	...	...	3s. to 5s.
Watermelons, Queensland, per dozen	...	...	...	...	...	8s. to 10s.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR
FEBRUARY.

Article.							FEBRUARY.	
							Prices.	
Bacon, Pineapple ...	...	...	...	...	...	lb.	9½d.	
Bran ...	...	...	...	...	...	ton	£5 to £5 15s.	
Butter, Factory ...	...	...	...	...	...	lb.	1s. 1d.	
Chaff, Mixed ...	...	...	...	...	...	ton	£6.	
Chaff, Oaten ...	...	...	...	...	...	"	£6 to £6 15s.	
Chaff, Lucerne ...	...	...	...	...	...	"	£4 to £4 15s.	
Chaff, Wheaten ...	...	...	...	...	...	"	£4 10s. to £5 10s.	
Cheese ...	...	...	...	...	...	lb.	10½d.	
Flour ...	...	...	...	...	...	ton	£10 15s.	
Hay, Oaten ...	...	...	...	...	...	"	£7 5s. to £7 15s.	
Hay, Lucerne ...	...	...	...	...	...	"	£3 15s. to £4 5s.	
Honey ...	...	...	...	...	...	lb.	2½d. to 2¾d.	
Maize ...	...	...	...	...	...	bush.	4s. 3d. to 4s. 9d.	
Oats ...	...	...	...	...	...	"	3s. 7d. to 3s. 9d.	
Pollard ...	...	...	...	...	...	ton	£7 10s. to £7 15s.	
Potatoes ...	...	...	...	...	...	"	£8 to £10 10s.	
Potatoes, Sweet ...	...	...	...	...	...	"	...	
Pumpkins ...	...	...	...	...	...	"	...	
Wheat, Milling ...	...	...	...	...	...	bush.	...	
Wheat, Chick ...	...	...	...	...	...	"	4s. 9d. to 5s. 6d.	
Onions ...	...	...	...	...	...	ton	£8 10s. to £9.	
Hams ...	...	...	...	...	...	lb.	10d. to 1s.	
Eggs ...	...	...	...	...	...	doz.	9d. to 1s. 3d.	
Fowls ...	...	...	...	...	...	pair	2s. to 3s.	
Geese ...	...	...	...	...	...	"	5s. 6d. to 6s. 3d.	
Ducks, English ...	...	...	...	...	...	"	2s. 6d. to 3s. 2d.	
Ducks, Muscovy ...	...	...	...	...	...	"	3s. 6d.	
Turkeys (Hens) ...	...	...	...	...	...	"	6s. to 8s. 3d.	
Turkeys (Gobblers) ...	...	...	...	...	...	"	10s. to 17s.	

ENOGGERA SALEYARDS.

[illegible]

Orchard Notes for April.

By ALBERT H. BENSON, M.R.A.C.

THE SOUTHERN COAST DISTRICTS.

The gathering and marketing of citrus fruit, as well as of pines, bananas, custard apples, persimmons, &c., is the principal work of the month. In the Notes for March I drew attention to the necessity for keeping all pests in check, particularly those attacking the ripening fruit. As it is the height of folly to look after the orchard thoroughly during the growing period of the crop and then to neglect the crop when grown, every possible care must be taken to keep fruit fly, peach moth, black brand, or other pests that destroy or disfigure the fruit in check, and this can only be accomplished by combined and systematic action. Citrus fruit at this time of the year often carries badly, as the stem is tender, easily bruised, full of moisture, and, consequently, very liable to the attacks of the blue mould fungus, which causes specking. The loss from this cause can be lessened to a considerable extent by carefully attending to the following particulars:—

- 1st. Never allow mouldy fruit to hang on the trees or to lie about on the ground. It should be gathered and destroyed, so that the countless spores which are produced by the fungus shall not be distributed broadcast throughout the orchard, infesting many fruit, and only waiting for a favourable opportunity, such as an injury to the skin by an insect or otherwise, combined with favourable weather conditions (heat and moisture), to start into growth.
- 2nd. Handle the fruit carefully to prevent bruising. Cut the fruit, don't pull it, as pulling is apt to plug the fruit—that is to say, to either pull the stem out or injure the skin round the stem—and a fruit so injured will go mouldy.
- 3rd. Sweat or dry the fruit thoroughly; if the weather is humid, laying the fruit out in the sun on boards or slabs is a very good plan.
- 4th. After sweating, examine the fruit carefully, and cull out all bruised or punctured fruit, and only pack perfectly sound dry fruit. It is better for the loss to take place in the orchard than for the loss to take place in the case in transit.
- 5th. If the mould is very bad, try dipping the fruit for a few seconds in a 2 per cent. solution of formalin. This will kill the spores, and if the fruit is placed in the sun and dried quickly before packing there will not be much chance of its becoming reinfested.

Don't gather the fruit too green, especially such varieties as the Beauty of Glen Retreat Mandarins, as immature fruit spoils the sale of the good article.

If the orchard has not been cleaned up after the summer rains, do so now; and do any other odd jobs that may be required, such as mending fences, grubbing out dead or worthless trees, cleaning out drains, &c.

Strawberry planting may be continued, and where new orchards are to be planted continue to work the soil so as to get it into the best possible tilth.

TROPICAL COAST DISTRICTS.

Clean up the orchards after the rainy season. Look out for scale insects, and cyanide or spray for same when necessary.

Go over the trees carefully, and when there is dead wood or water sprouts remove them. If bark fungus is showing, paint the affected branches with the sulphur and lime wash. Clean up bananas, pineapples, and other fruits, as after the end of the month it is probable that there will not be any great rainfall, so that it is advisable to keep the ground well cultivated and free from weeds, so as to retain in the soil the moisture required for the trees' use during the winter months. Keep bananas netted; destroy guavas wherever found.

SOUTHERN AND CENTRAL TABLELANDS.

If the orchards and vineyards have not already been cleaned up, do so. Cultivate or plough the orchard, so as to get the surface soil into good tilth, so that it can absorb and retain any rain that falls, as, even though the trees will simply be hardening off their summer's growth of wood, it is not advisable to let the ground dry out. Where citrus fruits are grown, attend to them in the manner recommended for the Southern Coast Districts; and when grown in the dry parts, keep the land in a state of good cultivation. Should the trees require it, a light watering may be given. Do not irrigate vines; let them ripen off their wood.

Farm and Garden Notes for April.

FIELD.—The wheat land should now be ready for sowing the early wheats, and that which has not been prepared should be ploughed without delay, April, May, and June at latest being the months for sowing. The main potato crop, planted in February and March, will now be ready for a first or second hilling up. The last of the maize crop will now have been got in. Where cotton is grown, the pods will now be opening, and advantage should be taken of dry weather to get on with the picking as quickly as possible. Picking should not be begun until the night dew has evaporated nor during rain. Sorghum seed will be ripe. Tobacco also will be ripening, and either the leaves or the whole plant harvested. Lucerne may be sown, as the growth of weeds has now slackened off, but the ground must be thoroughly prepared and cleaned. Sow oats, barley, rye, wheat, mangolds, and Swede turnips. Plant out *paspalum* roots. Seed wheat of whatever variety soever should be dipped in a solution of sulphate of copper (bluestone) in the proportion of 1 lb. of sulphate to 24 gallons of water. The seed may also be treated with hot water by plunging it in a bag into hot water at 120 degrees Fahr. for a minute or two, and then into water heated to 135 degrees Fahr. Allow it to remain in this for ten minutes, moving it about all the time. Then plunge the seed into cold water and spread out to dry. This plan is useful in districts where bluestone may not be obtainable. Another safeguard against bunt, smut, black and red rust is to treat the seed with formalin at the rate of 1 lb. of formalin to 40 gallons of water. Schering's formalin costs about 2s. 10d. per lb., and is sold in bottles. It is colourless and poisonous, and should be kept where no children or persons ignorant of its nature can have a chance of obtaining it. To treat the seed, spread it on a wooden floor and sprinkle the solution over it, turning the grain over and over until the whole is thoroughly wetted. Then spread it out to dry, when it will be ready for sowing. Instead of sprinkling, dipping may be resorted to. A bushel or so of seed is placed in a bag and dipped in the solution. During five minutes the bag is plunged in and out, and then the seed is turned out to dry. Formalin is less injurious to the grain than bluestone, but, while the latter can be used over and over again, formalin becomes exhausted. It therefore follows that only the amount required for immediate

use for sprinkling should be prepared. Do not sow wheat too thickly. Half a bushel to the acre is sufficient—more on poor land and less on rich soils. On light sandy soil the wheat should be rolled. On sticky land it should only be rolled when the land is dry, otherwise it will cake, and must be harrowed again after rolling. When the wheat is 6 inches high go over it with light harrows. If the autumn and winter should prove mild and the wheat should lodge, it should be kept in check by feeding it off with sheep.

KITCHEN GARDEN.—Hoe continually among the crops to keep them clean, and have beds well dug and manured, as recommended last month, for transplanting the various vegetables now coming on. Thin out all crops which are overcrowded. Divide and plant out pot-herbs, giving a little water if required till established. Sow broad beans, peas, onions, radish, mustard and cress, and all vegetable seeds generally except cucumbers. Early celery should be earthed up in dry weather, taking care that no soil gets between the leaves. Transplant cauliflowers and cabbages, and keep on hand a supply of tobacco waste, preferably in the form of powder. A ring of this round the plants will effectually keep off slugs.

FLOWER GARDEN.—The operations this month will depend greatly on the weather. If wet, both planting and transplanting may be done at the same time. Camelias, gardenias, &c., may be removed with safety. Plant out all soft-wooded plants such as verbenas, petunias, penstemons, &c. Sow annuals, as carnations, pansy, mignonette, daisy, snapdragon, dianthus, stocks, candy-tuft, phlox, sweet peas, &c. Those already up must be pricked out into other beds or into their permanent positions. Growth just now will not be too luxuriant, and shrubs and creepers may be shortened back. Always dig the flower beds rough at first, then apply manure, dig it in, and after this get the soil into fine tilth. Land on which you wish to raise really fine flowers should have a dressing of bonedust lightly turned in. Wood ashes also form an excellent dressing for the garden soil. Prune out roses. These may be planted out now with perfect success. Take up dahlia roots, and plant bulbs as recommended for March.

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NOTICE.

Queensland Agricultural Journal.

It is hereby notified that the *Journal* will be supplied to all members of Agricultural and Horticultural Societies who do not derive their livelihood solely from the land, on payment, in advance, of an annual subscription of 5s., which will include postage. Schools of Arts will be supplied at the same rate.

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Amount of one year's subscription should therefore be forwarded with Order Form, without delay, to the UNDER SECRETARY, Department of Agriculture and Stock, Brisbane.

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Agriculture.

VEGETABLE MATTER IN WOOL.

We are indebted to the courtesy of Mr. J. Macdonald, manager of the New Zealand Loan and Mercantile Agency Company, Limited, Brisbane, for the following information on the above subject, contained in a leaflet issued by an influential committee of representatives of the wool-growers of Australia, New Zealand, the London Selling Brokers, the Colonial Wool Merchants' Association, Bradford Top-makers, Spinners, &c., the German Combers' Association, the Roubaix Chamber of Commerce, and the Wool Buyers' Association. The chairman of the committee is Mr. J. E. Fawcett, Lord Mayor of Bradford:—

VEGETABLE MATTER IN WOOL.—A VAST EVIL AND ITS REMEDY

(Issued by the above Committee.)

An influential meeting of Australian and New Zealand wool-growers, British and Continental consumers and wool-brokers was held on 2nd October, 1907, at the offices of Messrs. Dalgety and Co., Limited, Bishopsgate street, London, to consider complaints from the manufacturing users of wool in Europe and America of the presence of vegetable fibres in wool imported from Australasia and other wool-growing countries, and, if possible, to devise means to remedy the evil.

The nature of the evil was explained. Small bits of bagging and string become mixed up with the wool, and, though the utmost care be taken in the "sorting" to pick these out, some of them pass with the wool through the washing process, and so through the combing, spinning, and weaving, because these fibres are then quite indistinguishable by the naked eye. When the manufactured cloth comes to be dyed, the presence of these vegetable fibres instantly declares itself, because wool, being an animal fibre, "takes the dye," while these vegetable fibres remain white or nearly so. Such goods are imperfect, and in that condition quite unmerchantable. Often there is not a single yard of the cloth without its blemish.

[NOTE.—Some dyes used for vegetable substances, as cotton, linen, are not suited for wool and conversely.]

To remove these defects is an exceedingly slow, laborious, and costly process. Every such fibre must be patiently picked out of the woven piece by the deft fingers of the "burler," it being impossible to detect the jute fibres in any previous operation. The utmost care must be used not to injure the cloth. It is an operation which is most trying to the eyes and calling for great skill. Some firms pay many thousands of pounds annually in wages to "burlers," as the women are called who do this work. If these fibres could be kept out of the wool in the first instance, this heavy annual tax upon the industry would almost cease.

If the manufacturer who suffers in this way were himself the purchaser of the wool, he would undoubtedly long since have found a remedy by enforcing reform. But the trade is now so specialised that it would be impossible to trace back the wool to its source. The buying agent, the top-maker or importer, the comber, the spinner, all handle and blend and mix the wool before it comes into the hands of the manufacturer as yarn. Even manufacturers who perform all

the operations themselves cannot escape, and, as explained above, the defects are not visible until the mischief is done. Hence the absolute necessity for dealing with the evil so that it may be attacked at its source.

HOW THE MISCHIEF IS CAUSED.

Vegetable substances which are found at various times, under varying conditions and in greatly varying quantities, may be divided into two classes:—

- (1) Vegetable substances in their natural state, such as burrs, grass seeds, thorns.
- (2) Vegetable fibres in more or less artificial association.

With regard to the first class, it may be stated that many ingenious and costly mechanical devices have been invented to get rid of these things. The Yorkshire Woolcombers' Association, Limited, paid £60,000 to a French syndicate for the English patent rights of a process for de-burring wool; and many times this sum has been spent in the same quest. The most effective method is to "carbonise" or "extract" such substances by the use of acids. This, however, inevitably *injures* and *deteriorates* the *wool fibre* itself. In practice it is only applied to such wools as are "full of burr" or seed. It is a process not to be seriously contemplated in connection with the better class of wools—the combing wools which fetch the highest prices; hence the great pains and cost incurred to get rid of these substances by mechanical means.

The second class of fibres find their way into the wool by man's assistance. They are equally, nay, even more detrimental and more difficult to eliminate. They are usually either jute, hemp, or cotton. They are found as—

Pieces of bagging.

Pieces of rope or twine used in tying fleeces.

Pieces of sewing twine.

Shreds of bagging, twine, &c., more or less abraded, which have been gathered up from the floor of the shearing-shed, the warehouse, or the quayside with wool which has been pulled out for sampling or has escaped through damage to the tare.

These fibres are more difficult to deal with, because:—

They are often too minute to be seen except by the aid of a magnifying glass;

They are especially, if unravelled, often not unlike greasy or dirty wool in colour;

They are frequently so numerous, and so distributed over the surface of the wool when the bale is first opened, that it would be practically impossible at whatever cost of time or labour to pick them all out;

When, after the wool has been "sorted," it goes through the process of washing, the fibres become softened, detached one from another, and are bleached as white as the wool itself, so that they cannot again in any subsequent process be readily detected by the eye;

Being straight, fine fibres, they behave like the wool fibres, and are ultimately spun into yarn with the wool.

The most careful investigation has shown that the great bulk of the mischief is traceable directly or indirectly to the unsuitable character of the wool-pack in common use in the colonies.

This pack is of jute, and the quality has steadily deteriorated for many years. But the deterioration has been more pronounced since the price of jute began to advance. A shorter fibre is now used, and the bagging is not so hard

or "clean" as it used to be—it is more "fuzzy." If a new pack be rubbed against the sleeve of a dark cloth coat, it will at once be seen that a number of fibres have come off the bag and are sticking to the coat. When a bale of wool is opened, it is found that the surface of the wool, which for three, six, or nine months has been in close contact with the tare, is frequently covered with thousands of such particles of jute fibre.

Whenever and wherever the pack is cut the material of which it is made frays, little bits come off, and stick to the wool.

REMEDIES FOR THE EVIL.

First and foremost the general adoption of a wool-pack of such a character that it will not depreciate the value of the wool it contains. The committee are pursuing inquiries in regard to the provision of a better bag. They hope shortly to be able to give further information, and to recommend an improved wool-pack and sewing twine for general use.

The adoption of such a standard pack, made of good, clean, hard twisted jute or hemp yarn, carefully sewn so that the pack does not need to be "cut down" at the corners in the baling press, and provided with a separate piece of canvas for the top of the bale, would do a vast deal to mitigate the evil.

The systematic emptying of the pack before it is put into the press. It is found that frequently bits of the canvas and ends of sewing twine come inside the new packs from the factory. Care should be taken to see that these are shaken out.

In the shearing-shed, in the classing and packing of wool, the utmost care should be used to prevent loose bits of twine, rope, or bagging coming near the wool, or being swept up with wool from the floor.

The tying of fleeces ought to be avoided entirely.

All straw &c., should be carefully removed from the shearing place before shearing commences.

In stores and warehouses where bales are exposed for sampling, the necessary opening of the tare should be done so as to damage it as little as possible. Bales should be opened at the seams by cutting the sewing twine, and all frayed edges and loose bits should be removed and destroyed.

It is recommended that printed cards should be provided for hanging in shearing-sheds and warehouses in the following terms:—

For Shearing-sheds.

1. All straw, &c., should be carefully removed from the shearing-shed before actual shearing is begun.
2. Turn out each bag before packing the wool, and see that it is clean and free from bits of hemp.
3. Loose bits of twine, bagging, or straw should be carefully kept apart from the wool.

For Warehouses.

1. All bales must be opened at the seams only, by cutting the blue twine.
2. Any frayed edges or loose pieces of string should be removed carefully and at once by men whose special care it is to watch the wools when "on show."
3. Warehouse "pullings" should be carefully looked over before being restored to the bales.

THE JACKSON POTATO-DIGGER.

We have received many inquiries from farmers concerning the newly invented potato-digger. All we are in a position to say about it is that at the trials its work was done most satisfactorily, all the potatoes being brought to the surface. The machine does not grade. For information as to price, or whether already procurable in the Southern States, we must ask our readers and other inquirers to communicate direct with Mr. Jackson, Taringa, near Brisbane.

MANURING EXPERIMENTS WITH POTATOES.

The experiments were carried out by Mr. Andrew Bell, at Strathpine, under the supervision of officers of the Department of Agriculture and Stock, and the results of the crop gave a good financial result and good return for the manure, although in both seasons the crop was much affected by blight, and was consequently light.

The soil of the experimental plots is a grey sandy loam, with sandy subsoil, and the land, originally scrub land, was cleared about ten years ago, and was chiefly under maize and potatoes. According to analysis the soil contains:—

		Agricultural Analysis.		Available Plant Food.	
		Sol. in HCl.		Sol. in Citric Acid.	
Total nitrogen	...	.140 per cent.		...	
Phosphoric acid	...	.091	„	...	.024 per cent.
Potash	...	.271	„	...	.012 „
Lime	...	.800	„	...	„

Each of the plots of one-tenth of an acre area had six drills 3 feet apart with 4 feet between the plots. The first crop was harvested in January, 1907; the crop was good, but had suffered from blight, and Mr. Bell estimates the loss by blight at least as one-third of crop. The results of the plots showed the necessity of a general manure with a liberal supply of potash. The return of the plots, and particularly plot 6, was very satisfactory.

The second crop was planted in July, 1907, and harvested in December, 1907. The rainfall during the six months was as follows:—June, 2.76 in.; July, .50; August, .60; September, .24; October, .96; and November, 4.39. The heaviest shower after planting was only 18 points, and the good rains in November came too late to benefit the crop. The plots with ammonium sulphate made a much quicker growth of tops than with nitrates. Kainite gave good crops of good quality, and gave the best result in connection with Thomas' phosphate in plot No. 4. The poor result of the heavily manured plot No. 6 must be attributed to the dry season and to the fact that the land towards this end of the field is rather lighter and sandier.

As the crop was affected by blight for several years running, the land should be put under other crops for at least one year before potatoes are grown again.

FIRST EXPERIMENTAL POTATO CROP, 1906.				SECOND EXPERIMENTAL POTATO CROP, 1907.			
No. of Experiment in each 10-acre.	Detail of Manuring per Acre—		Remarks on Growth by Mr. Bell.	Crop of Potatoes.		Cost of Manure per Acre in shillings.	Remarks on Growth by Mr. Bell.
	Lb.	Per Plot in— Cwt. qr. lb.		Per Plot in— Cwt. qr. lb.	Per Acre in— Tons.		
1	Unmanured ...	Large 3 1 26 Small 0 2 4	Crop poor and very blighted	Large 4 1 4 Small 1 1 0	2.01	42/-	Fair crop, but blighted
2	36 P ₂ O ₅ as 2 cwt. super-phosphate 10 N as ½ cwt. ammon. sulphate — K ₂ O	Large 3 3 2 Small 0 1 18	Very much blighted	Large 4 0 12 Small 0 2 24	2.09	45/-	Very large clean potatoes, but suffered much from blight
3	36 P ₂ O ₅ as 2 cwt. super-phosphate — N 26 K ₂ O as ½ cwt. potassium sulphate	Large 4 3 4 Small 1 0 20	Nice potatoes and fair crop, but also blighted	Large 4 2 4 Small 1 0 16	2.98	40/-	Large loss by blight
4	— P ₂ O ₅ ... 10 N as ½ cwt. ammon. sulphate 26 K ₂ O as ½ cwt. potassium sulphate	Large 3 1 16 Small 1 0 21	Nearly half of the crop was killed by blight	Large 5 0 4 Small 1 0 13	2.29	43/6	The best from start, but lost like others heavily from blight
5	36 P ₂ O ₅ as 2 cwt. super-phosphate 10 N as ½ cwt. ammon. sulphate 26 K ₂ O as ½ cwt. potassium sulphate	Large 5 3 16 Small 0 1 12	Did not suffer quite so much from blight	Large 3 1 5 Small 0 2 17	3.12	32/-	Very large tops from start, but want of rain checked the growth
6	72 P ₂ O ₅ as 4 cwt. super-phosphate 20 N as 1 cwt. ammon. sulphate 52 K ₂ O as 1 cwt. potassium sulphate CaO as 20 cwt. lime	Large 7 1 2 Small 0 3 0	Gave fine large potatoes, and but for blight should have yielded 5 tons per acre	Large 4 1 6 Small 1 0 24	4.01	81/6	This plot made very good growth, and was the best looking of all, but suffered more from blight and dry weather
7	...	Large 5 0 6 Small 0 2 0	About ½ cwt. of potatoes destroyed by fly	Large 2 1 4 Small 0 3 12	2.78	...	This heavily limed land was as dry as an ash-bed, the soil is rather too sandy

Dairying.

DAIRYING INDUSTRY.

COMPREHENSIVE REPORT—*continued*.

By G. SUTHERLAND THOMSON, Government Dairy Expert.

FACTORIES AND THE BUTTER BRANDS.

In this report it has been pointed out what an injurious influence the competition for cream has exercised on the general quality of butter and the uniformity of factory grades. I may be pardoned for again drawing the reader's attention to the payment of fictitious prices for cream by some factories; and, with a view of capturing the cream supply, evil influences have been introduced into dairying, and the advance of the industry has met with considerable opposition. As practically no distinction was made in the prices offered for superfine cream and pastry cream by the factories engaged in the bitter struggle for supremacy over the producer, managers were virtually compelled to blend the choice and bad creams to an extent that practically ruined the reputation of their first-class brands in the open market. It was naturally the earnest desire of every responsible factory employee to turn out as many boxes of first-class butter as possible to avert financial disaster to the factory, a fate which some of them narrowly escaped. It thus followed that much of the butter that was stamped first-class obtained the bare pass marks for that distinction—90 per cent.—instead of scoring a high first grade—94 per cent. What did this practice which the managers were forced to adopt result in? Very large consignments of butter, which the factory managers believed would scrape through as first grade, failed to score the necessary points, and were passed into a lower grade, perhaps as high seconds—88 per cent. or 89 per cent. Quantities of this butter may have sampled well the day after churning, thereby deceiving the manager, but the flavour of produce of this kind should not be relied upon by any butter-maker when the fact was known that the churnings were made up of different grades of cream. But satisfactory grading of cream could not be carried out by the factories, as the buildings were not equipped with the necessary ripening vats to treat cream of more than one quality, and in many cases this condition still prevails. Yet we have had to listen to the anti-grader's praises of the factory appliances, which, in his opinion, did "the deed" by lifting the dairying industry of Queensland into prominence.

To prove the utter unpreparedness of factories to comply with the Commerce Act in the number of grades of butter, of which there are five—namely, First Class Superfine, First Class, Second Class, Third Class, and Pastry—I shall give a summary of the number of brands used by our factories.

Out of 47 factories actively engaged in the export butter trade, 20 have 1 brand, 19 have 2 brands, 6 have 3 brands, and only 1 has 4 brands in use.

From these figures the producer will recognise how very badly prepared the factories were to ship brands of butter of a reliable quality, and I again ask the farmer to consider the result to himself had the Department of Agriculture paid no heed to the official inspection of dairy exports, as desired by the anti-grader. To justify the firm stand I took against the combined efforts of exporters, brokers, and factories to abolish grading and marking of boxes, I give the following extract from a letter received by a Queensland firm from a

representative of different sections of the produce trade of Great Britain, which is dated 22nd January:—

“Grading.”—You were quite right not to sign the petition. We have observed that several agents had done so, doubtless in order to curry favour with the shipper; but certainly the Government ought not to recede from the position already taken up by them. It would be a sad mistake, and a retrograde movement. We have not the slightest hesitation in saying that the C.I.F. business would be ruined if grading were not enforced and rigidly adhered to, and nothing has helped business in Queensland butter more than the knowledge that grading is compulsory, and is rigidly carried out. Even second grades are now so well defined that we can sell them readily on C.I.F. terms, a thing which would be utterly impossible if it were not for the guarantee of the Government grader. From our point of view, therefore, the system is equally beneficial to your makers (as it gives them the choice of the local or English market) and to ourselves, as it enables us to operate with confidence to ourselves and our buyers in your market.”

What appears above are the views of a responsible firm, and I may say the same opinions have been expressed to me in writing by numerous merchants in Great Britain, and by the leading daily and agricultural papers throughout Australia. My own experience amply confirms all that has been put forth by responsible parties in support of the compulsory inspection of dairy produce.

The writer of the extract just referred to mentions the fact (although not well established in Queensland is finding sympathy) that second grades of butter are being more thoroughly appreciated than previously. This is directly attributed to the greater confidence the home trade are showing in the genuineness of the article. This is reiterated in the following notice, which appeared in the Brisbane “Courier” of 4th March:—

“The Wide Bay Co-operative Butter Company have received word that a consignment of 200 boxes of second-grade butter brought 148s. on the London market, a record for second-grade butter.”

CHURNING NUMBER AND THE VAT.

As a good deal of support has been claimed for the vat theory in resenting the classification of butter, I might take this opportunity to point out the bad wisdom of adhering to this argument. It is claimed that butter made from a vat of cream is of the same quality, or, in other words, the churnings are identical in flavour, &c. This is not the case, as the experience of every butter-maker in Queensland has shown. Four churnings may be made from a vat of cream, and the time between each churning may be sufficient to practically ruin the flavour of the last churning, unless the churnings are done in rapid succession. When cream is fast in acid development and not absolutely sound, a couple of hours between a churning is sufficient to change the grade of butter from a first to a second.

GRADING OF BUTTER.

Messrs. W. Weddell and Co., in their “Colonial Dairy Produce Review” for the year ending 30th June, 1907, write as follows:—

“When the New Zealand Government some years ago instituted the compulsory grading of butter, and the prohibition of the export of all butter unless each box bore upon it the particular grade of the butter it contained, a very great interference with private enterprise was introduced; but the practical success of compulsory grading has amply justified its introduction. At that time Australia butter held the premier and New Zealand the secondary position for colonial butter in British markets. To-day the positions are reversed, and this change is mainly, if not entirely, due to the adoption of compulsory grading. There are certain factories in Australia, it is true, where grading is not compulsory, which now make butter equal in quality to the best

New Zealand; but it is only in very few cases that this happens. The great bulk of the New Zealand surpasses Australian, and brings a price higher by 2s. to 4s. per cwt.

"Some of the Australian States have lately adopted compulsory grading with satisfactory results which augur well for the future, but this reform is too recent to have yet produced any great change in quality or price. The subject, however, is a burning one, and in all probability before long grading will be compulsory throughout the Commonwealth. Its opponents in Australia, while admitting the superior quality generally of New Zealand butter, allege that the cooler climate is the cause of the better quality. They overlook the fact that this has not changed since grading began; and also that some of the very best butter in New Zealand and in the State of New South Wales is made in their hottest districts—viz., Auckland and the North Coast. It is almost universally admitted in Australia that compulsory grading improves the quality, because it stimulates factories to make an article to surpass that of their neighbours; but there is a reluctance among certain of the best factories to acknowledge the value of grading when butter is consigned to British markets for sale, where, it is alleged, and alleged truly, that the butter is bought on its intrinsic quality at the time of purchase and not on its grading quality before it is shipped from Australia. Again, opponents overlook the fact that as grading induces a healthy rivalry among the factories it must bring into existence a better all-round article, which, in turn, will command a higher range of prices for the entire output of the colony when it reaches British markets.

"One of the great advantages that grading has conferred upon New Zealand is this: It has brought about a regular standard of quality, and on the strength of the standard New Zealand has the advantage of two markets—one for 'forward' sales, and the other for sale on consignment. This selection of markets is of the utmost value. For example, last year, when record high prices were offered for 'forward' sales by British buyers, New Zealand grasped the opportunity and sold on this basis above 90 per cent. of the output at prices about £10 per ton over that sold on consignment. Australia, owing to the prevailing lack of grading, had virtually only the consignment market in which to sell. Selling 'forward' is not always the most profitable market, but those who, by reliable grading, have put themselves in a position to sell 'forward' are enabled to select which market they consider will pay them best. In Australia 'forward' selling is objected to by some on the ground that it is gambling with the future, but surely it is equally gambling with the future to ship on consignment in a distant market for sale on consignment.

"To secure the advantages of the 'forward' market, the chief essential is the establishment of a fixed and permanent standard of quality. Whether the standard in one State be higher or lower than that in another matters little, so long as the person buying 'forward' knows exactly what he is buying. Successful trading cannot exist when the purchaser is uncertain of the quality of the article he proposes to purchase.

"It was this uncertainty which caused the Home and Foreign Produce Exchange in London this year to rescind the rule in butter and cheese contracts which made the graders' certificate final as to quality. Unfortunately, the rescinded rule included New Zealand butter, against the grading of which only a very small percentage of buyers take any exception, and endeavours will be made at the first opportunity to restore the rule so far as New Zealand is concerned, and to frame a suitable rule to meet the case of Australia."

C.I.F. TERMS.

Every reader may not be conversant with the above abbreviations, and a brief explanation may be acceptable. In the butter business, and the same may apply to other departments of the export produce trade, occasions arise when butter is bought at the port of shipment at a stipulated price for the different

grades or qualities contained in a shipment. As the buyer in England, South Africa, or some other country is at the mercy of the seller, he takes advantage of the Government classification of the produce and pays according to it—First, Second, Third grade, as the case may be. Under these conditions, would it be wise to put a certificate number on the boxes instead of the grade distinction? I should think not; and, were the grading of butter withdrawn, C.I.F. terms, which is one of the privileges of a legitimate trading between two countries would quickly disappear. And here I might be forgiven for stating that some members of the export trade of Queensland, who enjoyed to the fullest possible extent the profits of C.I.F. terms last season, turned bitterly against grading at the close of the season. Never again are they likely to enjoy the same courtesy, consideration, and perhaps leniency in the grading of their produce, and doubtless their uncalled-for attitude generated in the more rigid inspection of their exports, which is now being enforced with credit to the producers of Queensland.

ERRORS IN THE COMMONWEALTH SYSTEM OF GRADING.

When the Commonwealth scale of points for use in the classification of export butter was first enforced, errors arose through the grade being decided on the total award for points. It thus followed that if a butter was awarded 50 points for texture, colour, &c., and 36 out of a total of 50 for flavour, the product was entitled to the first-class official stamp. At this same period Queensland was grading practically on flavour, and the requirements for flavour for each grade were as follows:—

First class	...	...	...	...	46 to 50
Second class	...	...	...	...	41 to 45
Third class	...	...	...	...	37 to 40

Before leaving for England in September, 1906, I made a suggestion for a meeting of Government dairy experts to give consideration to subjects of particular interest to all the States, but no conference was held until after my departure when it was decided to alter the scale of points and introduce into the new scale the principle of the Queensland system. The present scale, although an improvement on the first, gives too wide a range of points for superfine and first-grade classes of butter.

Personally, I should like to have seen the superfine grade omitted for a few years at least, as my experience of Australian produce in Great Britain proved that the reputation of the grade was in danger, and the writer's recent investigations into the keeping properties of butter at different temperatures confirms this view.

GRADE MARKS *VERSUS* CERTIFICATE NUMBERS.

The practice of marking the grade on butter that is classed superfine or first grade and omitting the stamping of the lower grades is, in the opinion of the writer, unfair to the principle of grading. It has been fully demonstrated that a butter, graded superfine, may develop fishiness in cool storage, and arrive in London a lower grade. Again, a trace of a stale flavour may be found in butter that has been stamped first class—perhaps a low first a day or two after it has been graded. If this quality of butter is not kept at a very low temperature, it will likewise deteriorate. After consideration of this and other points which have an important bearing on the value of butter grading, it illustrates that great care should have been taken before the superfine grade was introduced, so that the dangers operating against its success may have been avoided.

There is much to say in favour of marking low grades of butter, as it is this class of butter that requires to be stamped as a protection to the British merchant and small grocer and the Queensland dairy farmer. It is patent that stale butter will not improve in cool storage; therefore, there would be no danger of the grade changing from a third to a second or a second to a first, as the case may be.

CERTIFICATE NUMBER.

The placing of a certificate number only on boxes of inferior grades is not likely to be productive of much good in the disposal of the butter, and where there exists a desire to gamble with the produce the number gives the chief facility with which this may be successfully accomplished.

RUINOUS TAINTS IN EXPORT BUTTER.

There are many bad flavours found in the dairy produce of the State, and to treat each separately would entail very considerable work. Here I shall deal with those two taints—stale and fishy—which are the most costly to the producer and the industry generally.

FISHINESS.

A proof of the prevalence of fishy butter is well established in the hotels and restaurants throughout Great Britain, and during the writer's travels the flavour was the most prevalent found. By this I do not infer that all fishy butters come from Australia, but upon inquiry I learned that the Australian product gave more trouble in this direction than butter from other countries. And the belief that Australia is guilty of making faulty butter has gained firm ground in some quarters, and, consequently, retail merchants are shy in their purchases of many brands. It is unfortunate that in the minds of a section of the produce trade in Britain "fishiness" is stamped on the average box of colonial butter, and merchants who are not conversant with defects in flavour are responsible for the free use of the term in describing the flavour; hence a prejudice against Australian butter. But, generally speaking, a fishy taint is quickly and accurately detected by the trade, and the belief in Australia that many other faults in flavour are placed in the same category by responsible firms in Tooley street is entirely wrong. Had Australia given more credit to those merchants and judges of flavour in butter when their complaints of fishiness were more bitter a few years ago, and resolved itself into a board of inquiry with a heartfelt desire to right what was wrong, the position of Australian butter would have been on a higher plane to-day. The injury to Australia through this lack of duty cannot be estimated, and, to make the best of a bad job, the States should unite and take active steps to remove the stigma from its national industry.

Showing that fishiness was affecting butter from this State, and that the flavour had developed in cool storage on board steamers, I give the following extracts from my reports on Queensland shipments for the season of 1906-7:—

“Queensland Government Office,

“1 Victoria street, London,

“11th April, 1907.

“*Re* butter which recently arrived by the ss. ‘Orontes.’ One dozen boxes of ———— butter was carefully examined, and not one was free from fishiness. Different firms complained bitterly of the quality, and urged upon me to do something to improve the brand. I may say the ———— has established a bad name of late, the last four shipments being faulty. I would suggest that a searching examination be made of the salt used by the factory, and the methods adopted in the manufacture of the butter.

"10th May, 1907.

"Re fishy butter shipped by ss. 'Ophir.'

Factory Brand.	Graded as.	Graded on Arrival.	Condition.
...	1st class	2nd class	Fishy
...	do.	do.	do.
...	do.	do.	do.
...	do.	do.	do.
...	do.	3rd class	Very fishy
...	do.	2nd class	Fishy
...	do.	3rd class	Very fishy
...	do.	do.	do.
...	do.	do.	do.
...	do.	do.	do.
...	do.	2nd class	Fishy
...	do.	3rd class	Very fishy

"24th May, 1907.

"Re fishy butter shipped by ss. 'Omrah.'

...	1st class	weak 1st class	Fishy
..	do.	bad 1st class	do.
...	do.	3rd class	Very fishy
...	do.	bad 1st class	Fishy

"27th March, 1907.

"Re butter shipped per ss. 'Orient.'

...	1st class	2nd class	Fishy
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"10th June, 1907.

"Re butter shipped per ss. 'Oroya.'

...	1st class	bad 1st class	Slightly fishy
...	do.	do.	do.
...	do.	bad 2nd class	do.
...	do.	do.	Very fishy

"25th June, 1907.

"Re fishy butter shipped per ss. 'Ortona.'

...	1st class	bad 1st class	Fishy
...	do.	do.	Slightly fishy
...	do.	do.	do.
...	do.	2nd class	Fishy

FISHINESS DEVELOPING IN LONDON.

A fishy flavour may develop in Australian butter after going into cool storage in England; or it may weaken after exposure at ordinary temperatures.

It has been said that this is not uncommon in Tooley street, and it may be correct in cases where the taint was in its initial stage or the flavour was weak at the time of chilling, and the temperature at which the butter was stored may have been favourable to the taint.

On the subject of temperature and the storage of butter in London, I wrote to the Agent-General as follows:—

"Queensland Government Offices,

"1 Victoria street, London, S.W.,

"19th June, 1907.

"SIR,—I have the honour to suggest that the leading produce merchants in Tooley street be advised not to store Queensland butter at a higher temperature than 15 degrees Fahr., my reason for this being that the result of

my investigations into fishiness and other bad flavours in butter proved that a higher temperature than 15 degrees Fahr. favours the rapid development of a fishy flavour. When it is the intention of merchants to keep imported butter for weeks in cool storage, 10 degrees Fahr. or under is strongly recommended.

"I have the honour to be,

"Sir,

"Your obedient servant,

"(Signed) G. S. THOMSON."

As yet no remedy for fishiness can be authentically given, but preventive measures should be enforced as far as our belief of the cause and knowledge of the subject directs. This may be classed under three headings—viz., the Farm, Factory, and Steamer.

Farm.

Cleanliness in all branches of farm dairying will go a long way to remedy evils in flavour, and there should be stringency in the inspection of dairies to attain this end. The discontinuance of pooling cream should have a marked bearing in eliminating taints in butter, and it should do much to increase the percentage of a first-grade article by giving to factory managers a better control of the cream supply.

Uniform consistency in the fat content and solids of cream is also regarded as important in reducing the proportion of tainted butter.

Factory.

Cleanliness of factory and utensils.

The strictest attention should be given to all that pertains to the purity and sweetness of the atmosphere in the factory, and under no consideration should the smallest detail in the hygienic or sanitary surroundings of the cream supply be neglected. Sterilisation of the utensils should be strictly enforced, and managers should not be satisfied with the appearance of their factories until they are beyond the criticism of the most fault-finding farmer. The factory is the farmer's school of instruction in the modern requirements of a dairy, and this should not be lost sight of by all butter-makers and factory employees.

The water supply is an element that requires close inspection, as contamination may take place without any ocular change being noticeable in the water, or evidence of a kind likely to attract the attention of the most vigilant person, until injury is done to the flavour and keeping properties of the butter.

From various inquiries into the relationship of salt with fishiness, there is reason to emphasise the necessity for particular care on the part of factories to prevent the salt from coming into contact with foreign matter; and, from experiences of the industry, I should think there is much cause for reform in this direction. The finest and cleanest of salt should only be used by all factories, and efforts should be made to keep the salt in a dry atmosphere, owing to its deliquescent or absorbing properties.

CHILLING THE PRODUCT.

The importance of temperature to fishiness (which the writer has proven plays a prominent part in the growth of the flavour) requires prompt consideration by factory managers and the produce trade generally. Uniformity of temperature in the treatment of milk, cream, or butter is essential to the good qualities of butter; and, as it has already been pointed out, a heated condition of the cream or butter would appear to be a forerunner to fishiness.

CARRYING TEMPERATURE OF BUTTERS.

It will always be a matter of difficulty to make it understood that a very low temperature is absolutely necessary to prevent butter which is not perfect in quality from developing a foreign taste; and, no matter what progress we make in improving the general quality of the cream supply, quantities of second-class butter will be produced. It is, therefore, to temperature we must look for assistance in arresting the change of first-grade butter to second quality, and second grade into third. I have shown that a butter may appear perfect in flavour at the time of manufacture, but upon storing at certain temperatures quickly develop harmful flavours, amongst which the dreaded fishiness will most likely be found.

After grading, chilling to a temperature not higher than 10 degrees Fahr. for shipment is strongly recommended. So very important do I consider temperature in its application to fishiness and other destructive flavours in butter that I would suggest that butter should not be carried to London at a temperature exceeding 5 degrees Fahr.; and were the butter reduced to 0 degrees Fahr. or, better still—5 degrees, the gain would be of incalculable worth to Australian dairying. That the substance of the taint is in the cream originally may not be disproved, and, while engaged in the inspection of produce in Tooley street, I found a box of butter in which the bottom half was fishy, while the top half was free of the taint. The difference in the colour and texture of the portions was conclusive that they did not belong to the same churning.

Fishiness was found in many boxes of unsalted butter, and the season's produce from one factory was affected with the flavour. We have now disposed of one important factor. Let another be briefly considered—viz., salt.

SALT.

Unsalted butter may develop a strong taint, and during the writer's experience in London boxes of unsalted butter were found to show fishiness to an extent equal to badly affected boxes of salted butter, and this was further illustrated in experiments recently conducted by the writer.

But in considering this difference the reader must not forget that the bad flavour was unnoticeable in the butter when the salt was added, otherwise fishiness would be detected at the time of classing the produce, as shown by the official mark. The taint developed subsequently, and the extent of fishiness in the salted butter may be largely due to the salt fixing the flavour, so to speak, as the growth is proceeded with. But, as our knowledge goes at present, salt favours fishiness; and is this because the active body, presuming it is an organism, uses the salt as a food in ascribing to it life and temperature?

Is the flavour the same throughout? The flavour appeared to be equally distributed throughout the affected butter, there being no indication that it was more marked in the centre than the outside, and with regard to colour nothing was observed to suggest any peculiarity in this direction. Texture gave no indication of the cause, and, as already stated, neither did the colour; and I may mention that many boxes of fishy butter were beautifully made, and, had the fishy taste been replaced by a choice flavour of butter, a product of very high quality would have been reached.

Is there any guide that fishiness is likely to develop in butter? It has been the writer's experience, and which is reiterated elsewhere in this report, that an oily or tallowy butter, or a butter that has been sweated, is more subject to a fishy flavour, and it is also suggested that a flavour of pine and marrow precludes the taint becoming pronounced.

Will it affect a factory for a season? Fishiness will affect a factory's output of butter continuously for a whole season, and some of the best factories in the Commonwealth are suffering in this way.

Is the flavour usually accompanied by any other taint or deterioration in the butter? In many cases the affected butter appears entirely free from

flavours which invariably accompany old stale cream, while in other instances stale flavours or flavours of aged cream were noticeable.

Can we deduct that the flavour is caused by a germ? It is said that the taint is not confined to butter, as cases of fishiness in bacon have come under the notice of London produce merchants, and my recent researches conclusively prove that butter will develop a strong fishy flavour at 5 degrees Fahr.

Where may its origin, &c., be found?

That the flavour of fish is not directly attributed to a condition following the manufacture of butter is now beyond doubt, but there is ample evidence to show that temperature is a vital element in controlling the cause.

RESULTS OF EXPERIMENTS.

Cold Storage.—Experiments conducted by me during the years 1898 to 1902 conclusively proved that fishiness had developed in butter between the time of its manufacture and its removal from the refrigerated chambers, extending over a period of eight weeks.

In most cases the butter before being put in cold storage was choice in aroma; but, upon thawing, the taint was very pronounced, giving one the impression that the product had been impregnated with fish brine.

Acidity of Cream.—Exhaustive reports relative to the manufacture and analyses of the milks and water used in the making of the butter showed that the high acidity of the cream was no hindrance to the growth of the taint. The following table gives the marked difference between the hours of ripening of the cream from which the fishy butter was made, also the sweet and good flavoured supplies:—

Fishy Butter: (1) very strong fishy, hours of ripening, 48; (2) strong fishy, 72 hours; (3) ditto, 48 hours; (4) ditto, 24 hours; (5) full fishy, 60 hours; (6) ditto, 30 hours; (7) light fishy, 53 hours; (8) fishy, 45 hours; (9) strong fishy, 20 hours. Good Butter: (10) good flavour, 26 hours; (11) sweet, 28 hours; (12) sweet, 20 hours; (13) sweet, 14 hours; (14) sweet, quickly ripened; (15) sweet, quickly ripened; (16) good flavour, 51 hours; (17) good flavour, 48 hours.

Colostrum Milk.—Having discovered colostrum in a number of tainted boxes, I wrote as follows:—

Five factories provided answers showing that the condition of the separator bowl afforded evidence of the milk of newly-calved cows being used in the manufacture of some of the butter. The bacteriological table showed that, in the instances referred to, the analyses pointed to an abnormal state of the milk, pus cells, and germs associated with inflammatory tissue, having been found. The butter from these five factories was, to a greater or less degree, fishy.

Salt a Cause.—A special test of dry salt *versus* brine on the flavour of export produce was conducted. The finest product included in the experiment had the cream salted, and the second, third, and fourth best qualities had the grains brined in the churn. Results of the experiments were published in 1893, which were as follows:—

1. From the production of plate and tube cultures, serious contamination of butter was shown to follow milking with dirty hands and neglect to clean the udders of the cows.
2. When bacteriological plates were exposed to the air of a dirty milkroom, colonies of injurious germs grew abundantly, also moulds of different varieties.
3. Chemical and bacteriological examinations made of water used for washing butter showed that the quality varied from extra good to very low.

4. Cultivations made from sweet milk, cream, and butter produced *Oidium lactis* moulds.
5. Bacteriological examinations of sweet, separated, and butter-milk proved that contamination followed the use of dirty separators and churns.
6. Fishiness was found to be very pronounced in butter manufactured in districts where the herbage was rank at the date of making. In districts where the vegetation was well matured, only faint indications of fishiness were found.
7. Nearly all the fishy butter was manufactured from cream ripened to a high degree of acidity. Butter made from sweeter cream was free from a well-marked fishy flavour.
8. Colostrum was detected in the milk from five factories; fishiness was present in the butter in each instance.
9. The choicest boxes of butter were found to be free from fishiness before refrigeration; after refrigeration, nine boxes out of a total of seventeen developed fishiness, which varied from very strong to light flavour.
10. Discolouration was not observed in any fishy samples beyond what was noticed prior to chilling.
11. The fishy flavour appeared to be of equal strength throughout the body of butter.
12. Butter made from one churning, a portion of which was brined and dry salted, was unaffected with fishiness, and kept perfectly; while the other portion, that was dry salted only, developed a strong fishy flavour.
13. The best-keeping butter throughout all the tests was from brined butter grains, no dry salt being used.
14. Preservatives appeared to check fishiness.
15. Pure cultures of germs, made from very fishy butter, did not show colonies productive of fishiness.
16. Certain moulds were found to flourish in the presence of boracic acid in butter chilled.

Further experiments were conducted in which two factories took part under the following conditions:—From one churning one-half of the butter was brined in the granular stage, while the other half was dry salted on the worker in the usual manner at the rate of $2\frac{1}{2}$ per cent. The addition of preservatives was disallowed. Upon concluding the first examination, the butter was put into cool storage, and kept at a temperature of 26 degrees Fahr.:—

No. 1 Factory.—Dry Salted Butter.

Tested 9th October, 1901.

	Flavour.	Texture.	Colour.	Salting.	Packing.	Total.
Maximum points	45	20	15	10	10	100
Awarded	39	20	15	8	10	92

Brined.

„	39	20	15	10	10	94
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Flavour of dry salted butter was weak, showing milky brine; flavour of brined, weak.

Second Examination.—Dry Salted.

28th November.

Flavour.	Texture.	Colour.	Salting.	Packing.	Total.
32	20	15	10	10	87

	Brined.				
	36	20	15	10	10
Flavour faintly fishy.					91

No. 2 Factory.—Dry Salted.

9th October.

40	18	15	10	10	93
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	Brined.				
	42	19	15	10	10
Flavour sweet.					96

Second Examination.—Dry Salted.

28th November.

32	20	15	10	10	87
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Flavour very distinctly fishy.

	Brined.				
Flavour.	Texture.	Colour.	Salting	Packing.	Total.
42	19	15	10	10	96
Flavour unaltered.					

This test shows that the practice of brining improved the keeping quality of the butter, and retarded fishiness. Plate cultures, taken after refrigeration, showed numerous colonies of lactic organisms from the unbrined samples, together with a few foreigners, which naturally were to be expected. Before refrigeration, fishiness was again absent to taste, so that the results of the experiments tend to show that a fishy flavour can develop during refrigeration.

Benefits of Brining.—As salting in the churn appears to arrest a fishy taint, the good features of the method may be enumerated.

Further progress was made with the experiments; and samples made from the same supply of cream containing dry salt only, and without salt, but having a chemical preservative instead, were chilled for two months, and at the conclusion of the test the sweet butter did not show a trace of fishiness, while in the salted evidence of the taint was found.

In 1902 a second series of tests threw still more light on the salt theory, and demonstrated the fact that the most encouraging results were obtained when the temperature of the butter did not exceed 20 degrees Fahr. Very choice samples, however, kept for two months at 32 degrees Fahr., without showing signs of deterioration. The chemical and bacteriological analyses conducted during the four years of the investigations (1898-1902) numbered 1,000.

A THOROUGH INVESTIGATION NECESSARY.

In view of the loss the State has sustained through fishiness in butter, I would very strongly urge that a searching investigation into the cause of the taint be instituted by the Government, on the following lines:—

Test 1.—Influence of salt.

Test 2.—Influence of water.

Test 3.—Influence of cream.

A large quantity of cream, sufficient for each test, should be put to one side by the factory experimenting, and nothing should be permitted to interfere with the accuracy of the work. For convenience it would be preferred to divide the tests into lots and parts, each part of cream to be equivalent to four and a-quarter boxes of butter.

The butter should be examined a few days after manufacture, then chilled to a temperature of 30 degrees Fahr. for two days, afterwards thawed to a temperature of 65 degrees Fahr., and again tested; returned to cool storage,

there to be kept for six weeks at the following temperature:—0 degrees Fahr., 10 degrees Fahr., 20 degrees Fahr., and 30 degrees Fahr., when the final examination should be made. In judging the boxes of butter, the scale of points to be chosen should be as follow:—

Flavour, 70. Texture, 30.

First-class butter to gain from 65 to 70 points for flavour.

Second-class butter to gain from 61 to 64 points for flavour.

Third-class butter to gain from 57 to 60 points for flavour.

Chemical and bacteriological examinations to be conducted throughout the experiments.

Test 1.—Lot 1.

Part 1.—To be salted at the rate of one quarter-pound to the gallon of cream, and $1\frac{1}{2}$ per cent. to the butter.

Part 2.—To receive no salt in the cream and 2 per cent. in the butter.

Part 3.—To be brined in the churn. No salt to be added to the butter.

Part 4.—To be salted on the worker at the rate of $1\frac{1}{2}$ per cwt. All other details in manufacture to be the same throughout manufacture.

Lot 2.

Divide another quantity of same supply cream into four equal parts.

Part 1.—To receive no salt in cream or butter.

Part 2.—To receive 1 per cent. of dry salt in butter.

Part 3.—To receive $2\frac{1}{2}$ per cent. of dry salt in butter.

Part 4.—To receive $3\frac{1}{2}$ per cent. of dry salt in butter.

Lot 3.

Divide another quantity of same supply of cream into four equal parts.

Part 1.—To be salted at the rate of $3\frac{1}{2}$ per cent.

Part 2.—To be salted at the rate of $3\frac{1}{2}$ per cent.

Part 3.—To be salted at the rate of $3\frac{1}{2}$ per cent.

Part 4.—To be salted at the rate of $3\frac{1}{2}$ per cent.

} Use different brands
of salt.

Lot 4.

Divide another quantity of same supply of cream into four equal parts.

Salt to be taken from centre of bags only, and the same brands as above to be used, and the same quantities of salt.

Lot 5.

Divide another quantity of same supply of cream into four equal parts.

Salt to be taken from around the sides of bags only, and the same brands as above to be used, and the same quantities of salt.

Test 2.—Influence of Water.

Tests to be made with the ordinary factory water, also with the factory water filtered and condensed. Further tests should be made with water of the finest quality in the district.

Test 3.—Influence of Cream.

Cream from selected quantities of choicest quality should be used in Part 1 of the test, secondary cream in Part 2, and third-grade cream in Part 3. One box of each to be thoroughly washed free from buttermilk in the churn. In other respects treatment to be the same.

Inspections should be made of the farms supplying the cream, and everything connected with the milk and cream supply carefully noted. All tests for acidity, &c., to be recorded by the factory manager.

The experiments should be made at a factory where fishiness has been in evidence.

These suggestions to be regarded as a rough draft of the scheme.

OFFICIAL CORRESPONDENCE.

Being fully cognisant with the prevalence of fishiness in Australian butter, and the necessity for a searching investigation into the cause of the taint, I wrote as follows to the Agent-General, Sir Horace Tozer, who, fully recognising the importance of an inquiry, brought my suggestion under the notice of his colleagues in London:—

(Copy.)

“ Queensland Government Offices,

“ 1 Victoria street, London, S.W.,

“ 14th March, 1907.

“ SIR,—I have the honour to suggest that the subject of an investigation into the cause of fishiness in butter should be seriously considered by the Australian Governments, for the following reasons:—Fishiness is costing the Commonwealth of Australia thousands of pounds annually in reduced prices of butter, and the reputation of Australian brands in the London market is suffering in consequence. Further, the taint is militating against Government grading, and is likewise impeding the progress of the States in competition with other butter-exporting countries, such as Denmark, Argentine, and Siberia.

“ To illustrate the danger to grading, I might point out that fishiness is seldom detected in butter at the time of shipment from the Australian States, but upon arrival in London whole parcels bearing the first-grade stamp of the Commonwealth Government are found tainted with the flavour. An inquiry into its hurtful effects would no doubt show the necessity for immediate action being taken with a view to a remedy being found.

“ I have the honour to be,

“ Sir,

“ Your obedient servant,

“ G. S. THOMSON,

“ Dairy Expert for Queensland.”

I also had copies of the following letter sent to the leading produce merchants in London, to ascertain their views on the subject; and I drew the Agent-General's attention to the correspondence:—

“ Queensland Government Office,

“ 1 Victoria street, Westminster,

“ London, S.W.,

“ 16th April, 1907.

“ SIR,—I have the honour to draw your attention to the very urgent need for an investigation into the cause of fishy flavours in butter, and the conditions favouring the growth of same. It is generally known that fishiness is more prevalent and pronounced in salted than unsalted butter, and I have demonstrated that temperature governs, to a great extent, the development of the flavour, but up to the present little is known as to the true cause of the taint.

“ As it concerns you as well as the Queensland Government, would you assist in this suggestion being given effect to, by briefly commenting on the extent of the flavour in colonial produce, and its influence upon the market value and popularity of the brands. I might also mention that fishiness is militating against the value of Government grading of butter, as it has been

conclusively proved that the flavour attacks the chilled product; prior to shipment it is seldom in evidence, and when detected the butter is stamped accordingly by the Government graders at Brisbane.

"I have the honour to be,

"Sir,

"Your obedient servant,

"G. S. THOMSON,

"Dairy Expert for Queensland."

(Copy.)

"The Office of the Agent-General for Queensland,

"1 Victoria street,

"London, S.W., 19th April, 1907.

"SIR,—I have the honour to again report on the presence of a fishy flavour in our butter, and with particular reference to the shipments from the ——— factory. The last parcel, which I have already commented on, was very strong in the flavour, and I may say it was the worst fishy butter I have ever sampled. The buyers of this brand, which is reported to be the factory's best, are much concerned at the extent of the taint, and hopes are entertained that other factories will not become affected. To check the progress of this costly flavour, and, if possible, find the cause, I would suggest that the Government investigate the matter in a thorough manner.

"To substantiate what I have said with reference to the injury fishiness is causing our butter export trade, I beg to quote from letters received from Tooley-street merchants in reply to my inquiries into fishiness in Queensland butter.

"I have the honour to be,

"Sir,

"Your obedient servant,

"G. S. THOMSON,

"Dairy Expert for Queensland."

"The Hon. Sir Horace Tozer,

"Agent-General for Queensland."

(Copy.)

"Head Office, Colonial House,

"17 to 25 Tooley street, London, S.E.,

"17th April, 1907.

"The Agent-General of Queensland, Westminster.

"DEAR SIR,—In reply to the latter addressed to us by Mr. Thomson, we are very pleased to see that this question of fishiness in flavour of butter is being taken up enthusiastically.

"For years past the question has arisen, particularly where new countries and new sources of supply have been opened up, and all sorts of theories have been put forward as to the cause of this unpleasant flavour in the butter; but, so far as we know, no scientific or actual decision has been arrived at.

"The fact, however, remains, that this flavour crops up again and again in what are otherwise well-made butters, and we can but think that this most objectionable flavour is caused through dirt or unsanitary surroundings at the time either of milking or of handling of the cream. We on this side often

experience very great difficulty with butters, which, on coming out of the steamer in a hard frozen condition, open up fairly well. This fishy flavour is then scarcely perceptible, but immediately the cold is out of the butters and they are placed upon the table for consumption, then this fishiness rapidly develops, becomes very pronounced, and is most objectionable.

"The influence it has on the reputation of certain brands is very marked, and the best buyers carefully avoid those brands which they find from experience develop this fishy flavour. Agents have difficulty in selling, and the price invariably suffers.

"We congratulate you upon taking up this matter, and can assure you in is a very serious drawback to any butter to have this fishy flavour, which is one of if not the most difficult of the objectionable flavours we have to contend with on this side.

"Yours truly,

"MILLS AND SPARROW."

(Copy.)

"West Smithfield,

"London, E.C., 15th April, 1907.

"G. S. Thomson, Esq.,

"Queensland Government Office,

"1 Victoria street, S.W.

"DEAR SIR,—In reply to your favour of 4th March, which has just been handed to us by our Tooley-street branch, it is quite true that fishiness does occur more frequently in salt butter than in the unsalted article, and it is possible that this may be due to bad quality of the salt; but that this is not the sole cause is proved by the fact that several large parcels of unsalted butter have this season developed the taint very badly.

"There is no doubt that, next to rankness, fishiness is the worst flavour that it is possible to find in butter. No good buyer would knowingly purchase fishy butter for sale in any retail shop; and it very often happens that, if the defect is not noticed at the time of purchase, and it develops after it is taken out of cold store, buyers will consider that the fault is sufficient to warrant cancelling the purchase.

"The influence upon the popularity of the brand is very marked. To find fishy flavour in two consecutive parcels is quite sufficient to entirely ruin the reputation of the butter for the season at least, and it becomes necessary to create quite a fresh outlet for it.

"Whilst on this subject, we take the opportunity of giving you our views respecting one or two of the points contained in yours of the 18th February last.

"First of all, with regard to the quality of Queensland butter, we may say that there are certain fancy brands of Victorian and New South Wales butter which, in our opinion, are finer than any Queensland butter we have ever seen.

"Secondly, with regard to fishiness, and supplementing the remarks we have already made above, we have found that this flavour is the one most prevalent in bad Queensland butter. We consider that it is generally caused by the cream having become heated prior to its arrival at the factory, or by not having been sufficiently cooled before leaving the creamery; and, in any case, it is our experience that butter, which, on leaving the churn, was apparently of excellent quality, and in which it was practically impossible for even the most skilful expert to trace any suspicion of bad flavour, has, during the voyage, developed fishiness very strongly, and on tracing the butter to its origin it has generally been found that the cream was heated in transit from the creamery to the central factory.

"Fishiness may also be developed in quite perfect butter by keeping it out of cold store after it has once been frozen. We have found that Queensland butter requires exceptional care, and it very soon loses its flavour if kept out of cold store, as it very often is, for days or even weeks. We have made an invariable practice of obtaining possession of the butter immediately it is landed, and putting it into our refrigerators, holding it there until it is actually put into consumption by our retail customers. This is the only satisfactory way of dealing with Queensland butter.

"With regard to grading, we are quite of opinion that the grader should base his judgment on flavour, and, so long as it is efficiently carried out, we consider that grading by the Government is very beneficial, and likely to help the sale of Queensland butter. The great point to bear in mind is, that buyers should be able to rely upon getting uniform and reliable quality when purchasing butters of either Superfine or First Grade description.

"Yours truly,

"LOVELL AND CHRISTMAS, LIMITED,

"W. G. LOVELL, Director."

"29 Tooley street,

"London, 19th April, 1907.

"G. S. Thomson, Esq.,

"Dairy Expert,

"Queensland Government Office,

"1 Victoria street, Westminster.

"DEAR SIR,—Referring to your circular letter of the 4th March, we agree with you that fishiness is more prevalent in salted than unsalted butter, and no doubt a low temperature would assist in relieving merchants of the trouble, as the fishiness apparently develops in transit, it being practically unknown in the colonies.

"With this flavour in butter, no matter how fine the quality, it means ruination to any shipper; butter of the finest texture, and otherwise of top market value, not bringing more than the commonest grading, the value in every instance being reduced by at least 8s. to 10s. per cwt. Furthermore, once a brand gets a reputation of being fishy, it has to come very fine and very regular for a long period before the idea is dissolved and buyers get back on to it with confidence.

"We ourselves have never seen in any part of the colonies fishy butter; we have examined brands both in Australia and New Zealand, and reported on them as being as fine in flavour and all other points as we could wish; but, in one instance, after we had written home drawing attention to the high quality of one factory, on our return we found it had developed fishiness, and we are convinced that this fishy flavour is developed in the refrigerating chamber during transit.

"Yours faithfully,

"Per pro Andrew Clement and Sons, Limited,

"(Signed) J. WALLACE."

"57 Klea Avenue, Clapham Common,

"London, S.W., 19th April, 1907.

Re Fishiness in Butter.

"DEAR SIR,—In answer to your communication of the 16th instant, I beg to offer the following suggestions for your consideration:—

"Although the actual cause of fishiness in butter has not yet been discovered, a great deal of it can be avoided by—a careful supervision of creams; attention to temperature; and pasteurisation. Do not mix good and bad

creams together; it is far better to make two qualities of butter (good and bad) than all bad. When the butter is made, get temperature down as soon as possible, and keep it down.

"Another point which I think is of importance is the rank state of herbage after continuous rains. I fully believe this has caused more fishiness during the present season than any other cause. In support of this contention I may state that some considerable number of factories, bearing the highest reputation for the choicest butters in Victoria and New South Wales, have been turning out butter with fishiness fully developed. Every State in the Commonwealth of Australia has the taint more or less, and I have repeatedly seen a parcel of butter sold at a considerable loss on this account; there is no counter trade for a fishy butter, and I have heard that butter so affected has lost as much as 10s. per cwt. in value.

"The taint is very seldom found in pasteurised butter, neither is it prominent in Danish butter; the cows in Denmark being mostly stall fed seems to throw a little light on the matter.

"Fishiness is found a great deal in Canadian and Siberian butters, but is absent from American renovated butter, although it is found in American creamery butters. The fact of fishiness not being developed or discovered by the graders in Queensland previous to the butter being shipped emphasises the necessity of having a Government official in London to examine the butters on arrival.

"Trusting these few remarks may be of service to you, and wishing you every success in your endeavours to discover the cause of this bad odour,

"I remain,

"Your obedient servant,

"(Signed) H. ALLAN.

"G. S. Thomson, Esq.,

"Dairy Expert for Queensland."

"F. J. Lloyd, F.C.S., F.I.C.,

"Analyst and Bacteriologist,

"Consulting Chemist British Dairy Farmers' Association,

"Agricultural Analyst for the counties of Devon, Kent,
Somerset, and Surrey, &c.

"Laboratory, Muscovy House,

"Trinity Square,

"London, E.C., 28th February, 1907.

"G. S. Thomson, Esq.

"MY DEAR SIR,—I am pleased to hear that you are taking steps to have the cause of fishy flavour in butter investigated.

"Some years ago, at the suggestion of Messrs. Weddel and Company, I did a little bacteriological work to see whether I could discover the cause, but I found that difficulties arose which would require some considerable amount of time and expense to try and overcome, and as I had neither the time nor means at my disposal I did not proceed further with the investigation. I mention these facts to show you that if it is determined to take up this matter it must not be expected that results will be obtained immediately. I should think it likely that it would require a year or two of careful work, the cost of which would, naturally, be considerable. But it seems evident that without such an investigation this cause of loss to colonial butter-makers will not only continue, but may become very serious, and I should think that it is better to start an investigation now than wait until one becomes a necessity. You ought to have no difficulty in getting all the Australian colonies who

export butter to join in contributing the necessary funds, but I doubt whether our Board of Agriculture would assist you, as I do not think it is a trouble which affects the English farmer. If I can help you in any way I shall be pleased.

“Yours faithfully,
“(Signed) FREDK. J. LLOYD.”

OFFICIAL EXAMINATION OF EXPORTS IN LONDON.

Upon my return to Brisbane from London I wrote on the above subject as follows, which appeared in the Australian and New Zealand Press:—

It is patent to everyone that dairy produce from the Commonwealth is generally sold as Australian, and any carelessness on the part of factories is detrimental to the whole industry. The co-operative factories of Australia and New Zealand have recognised this fact, and they are now being represented in Tooley street by competent judges of produce sent from Australia, whose business is to report on everything they consider hurtful to the success of individual factories and the co-operative body as a whole. They are certainly to be congratulated in their efforts to improve the quality of Australian butter, and to create a better demand and higher price for the general output. Australia has a long way to make up on Denmark in butter-making, and the great gulf between the prices of butter from the two countries is not because Australia cannot deliver produce in Tooley street equal in quality to Denmark, but of the uncertainty in the flavour of a proportion of Australian brands, and the unreliability of the general output of many factories. Denmark's triumphal position in Britain is chiefly attributed to the uniformity of her produce, and New Zealand is following in the same direction with very encouraging results. And the same may be said of the best factories in Australia; but what proportion of the Commonwealth do they represent? may be queried. It is not the majority, and here we are called upon to direct our efforts to raise the standard of third-grade butter to second, and second to first, and to maintain a thorough distinction between the grades, thereby ensuring the confidence of the buyer that he is buying first and nothing else. But the average first-grade brands of Australian factories are not true to description as determined in London; and, unfortunately, the guilty one escapes the punishment he deserves. It is the grader who is saddled with the blame, and through the absence of Government representation in London to ascertain these things Queensland butter has been injured, and the reputation of the inspectors discredited when they were not at fault.

Grading has, without question, done more to uplift the market value of butter than any branch of education introduced on behalf of the industry. The institution of the system of grading in Queensland was a big undertaking, and before its beneficial effects were illustrated radical changes had to be made in the manufacture and classification of the butter into its respective qualities. The graders had, therefore, a heavy task to perform, and, although they could not at the outset stem every abuse current, their good work soon became evident in London and elsewhere.

INSPECTOR FOR LONDON.

Official examination of butter in London has been the subject of considerable comment of late, and it may be opportune to discuss it at this stage. In the opinion of the writer it is an absolute necessity, but considerable care is required in the selection of a suitable person. This may be regarded as of secondary importance to the lay mind, but from an educational and commercial standpoint it is fraught with much danger. For a person to do the work and give satisfaction to both parties in Australia and London it would be preferred were he an officer who had a knowledge of the conditions prevailing in the

State he represents, also an acquaintance with the factories and the officers upon whom the grading of the produce devolves. Such a person, having in addition to this a knowledge of the market requirements, would fulfil the demands necessary to giving expert advice on all matters relative to the quality of dairy produce. In Australia or any export country in which the educational side of dairying claims so much importance, care should be taken that it is not sacrificed to give preference to the commercial aspect of the question. On the commercial side, the judge who is purely a business man has buyers for all qualities of butter, and because a parcel of produce is suffering from a flavour which betrays a fault in the cream or manufacture, but is not in any way disliked by the retail merchant or wholesale buyer, his opinion would be to the disadvantage of the educational side of dairying if it is from a purely business standpoint. And reports on butter and cheese by one not intimate or thoroughly conversant with the Australian side of dairying would be subject to error, and the officer's efforts, no matter how earnest they may be, cannot possibly be attendant with success to the industry as a whole. To detect a foreign flavour, as the average man is capable of doing, is of reduced value when he has no knowledge as to the cause of it. Again, some flavours in the States of Australia are indigenous, the outcome of weeds, cultivated plants, and crops which grow at different seasons of the year; also, we have what may be termed climatic flavours. These, to the palate of the stranger in England, Scotland, or Ireland, may be misinterpreted, and lead to abuse of inspection, not only in London, but in Australia. Further, I might draw the reader's attention to the fact that terms descriptive of butter are not synonymous in the two countries, which is another reason for care in the mind of the inspector.

GOVERNMENT EXPERTS AND GRADERS.

From what has been said, I would strongly suggest that the dairy experts of the butter and cheese exporting States of the Commonwealth who know the internal working of the industry under their care, and claim a knowledge of the science and practice of their profession, should be permitted to go to London for a season every few years, to study the market requirements and the efforts of individual factories, and the grading for which they have control. Experience in Tooley street better fits a man for the responsible duties of his office in Australia, as he will learn a lot to his advantage as an adviser and instructor to a Government and State.

I would also suggest that a grading officer be sent to England every two years to spend a season there to inspect shipments and to thoroughly examine the character and details of all classes of perishable exports. A schooling in Tooley street and other commercial centres of our exports would thoroughly convince officers of the value of stringency in the inspections, and the dire necessity for going into every detail in the classification of produce.

[TO BE CONTINUED.]

REMEDY FOR SCOURS IN CALVES.

Mr. F. Henrickson, Sharon, writes:—I have on several occasions read in the "Queensland Agricultural Journal" remedies for this common complaint, remedies all of which no doubt are effective, but at the same time cost money, and are not always at hand in the bush. I wish to point out to the readers a very simple cure, and one every dairyman easily can grow on the farm, and, at the same time, being an ornament on any place or garden—namely, pomegranates. Take half of an ordinary sized fruit, chop it up, seeds and all, and boil in about 1 pint of milk or water; boil it down to about $\frac{1}{2}$ pint, and give it to the sick animal in a bottle. One dose, I have found, will cure it; if not, give it again in a day or two's time. Gather all the fruits when ripe, cut them up in thin slices, and sun dry them, and they will keep for a long time, and always be on hand.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE,
GATTON.

RETURNS FROM 1ST TO 29TH FEBRUARY, 1908.

Name of Cow.	Breed.	Date of Calving.	Yield of Milk.	Babcock Test, Per cent. Butter Fat.	Commercial Butter.	Remarks.
			Lb.		Lb.	
Careless ...	Jersey ...	29 Oct., 1907	530	5·2	30·86	
No. 48 ...	Ayrshire Sh'rth'rn	14 Feb., 1908	763	3·6	30·76	
Graceful ...	Shorthorn ...	1907	617	4·4	30·40	
Cocoa ...	Jersey ...	20 Nov. „	657	4·0	29·43	
Beauty ...	Ayrshire ...	21 Dec. „	688	3·6	27·74	
Butter ...	Shorthorn ...	22 Aug. „	519	3·9	26·66	
No. 112 ...	Grade Jersey ...	23 „ „	482	4·9	26·45	
Eve ...	Jersey ...	24 „ „	472	4·9	25·90	
Mona ...	Holstein-Sh'rth'rn	26 Oct. „	696	3·3	25·72	
Dripping ...	„ „	28 Nov. „	573	4·0	25·67	
Bee ...	Jersey ...	16 Jan. „	559	4·0	25·04	
Nellie II. ...	Shorthorn ...	26 Dec. „	635	3·6	25·60	
Gurney ...	„	13 Nov. „	591	3·6	23·82	
Laura ...	Ayrshire ...	20 May „	545	3·9	23·80	
No. 1 ...	Shorthorn ...	2 Dec. „	596	3·3	23·60	
Dot ...	„	„	560	3·8	22·83	
Ethel ...	Holstein-Sh'rth'rn	22 Aug. „	415	4·8	22·30	
Bliss ...	Jersey ...	14 Sep. „	469	4·2	22·06	
Rosepetal ...	Shorthorn ...	26 Jan. „	570	3·5	22·34	First calf
Lemon ...	Guernsey-Sh'rth'n	Aug. „	479	4·0	21·45	
Honeycomb ...	Shorthorn ...	23 „ „	507	3·8	21·57	
Orange ...	Grade-Guernsey	1 Oct. „	466	4·2	21·92	
Linnet ...	Ayrshire ...	13 Dec. „	583	3·1	20·24	
Gem ...	Shorthorn ...	29 Aug. „	471	3·9	20·57	
Clare ...	Jersey ...	Sep. „	418	4·7	21·90	

The cows were depastured in different fields. During the early part of the month grass was rather scarce.

HORSE-BREEDING.

By P. R. GORDON.

Referring to his article on horse-breeding in the February issue of the Journal, Mr. Gordon writes:—

In my short article on the above subject, contributed to your February issue, I gave the average heights of horses used in the different divisions of the Imperial army, from information supplied to me. I am now in a position to furnish authentic information on the subject. My son, Major Gordon, of the A. F. Artillery, has handed me a copy of the Field Service Pocket Book for 1907, issued by the General Staff, War Office, in which the heights of horses, without shoes, for active service, are given as below the ages stipulated being from six to twelve years:—

Cavalry	...	...	...	15	to 15·2 hands
Artillery and Engineers	...	...	...	15·0½	„ 15·1½ „
Army Service Corps	...	...	...	15·2	„ 15·3 „
Mounted Infantry	...	...	...	14·2	„ 14·3½ „

Mules. Ages from four to fifteen years.

Draught	...	...	...	from 14·3	to 15·2 hands
Pack	...	...	...	„ 14·2	„ 14·3 „

The Horse.

POINTS OF THE SUFFOLK HORSE.

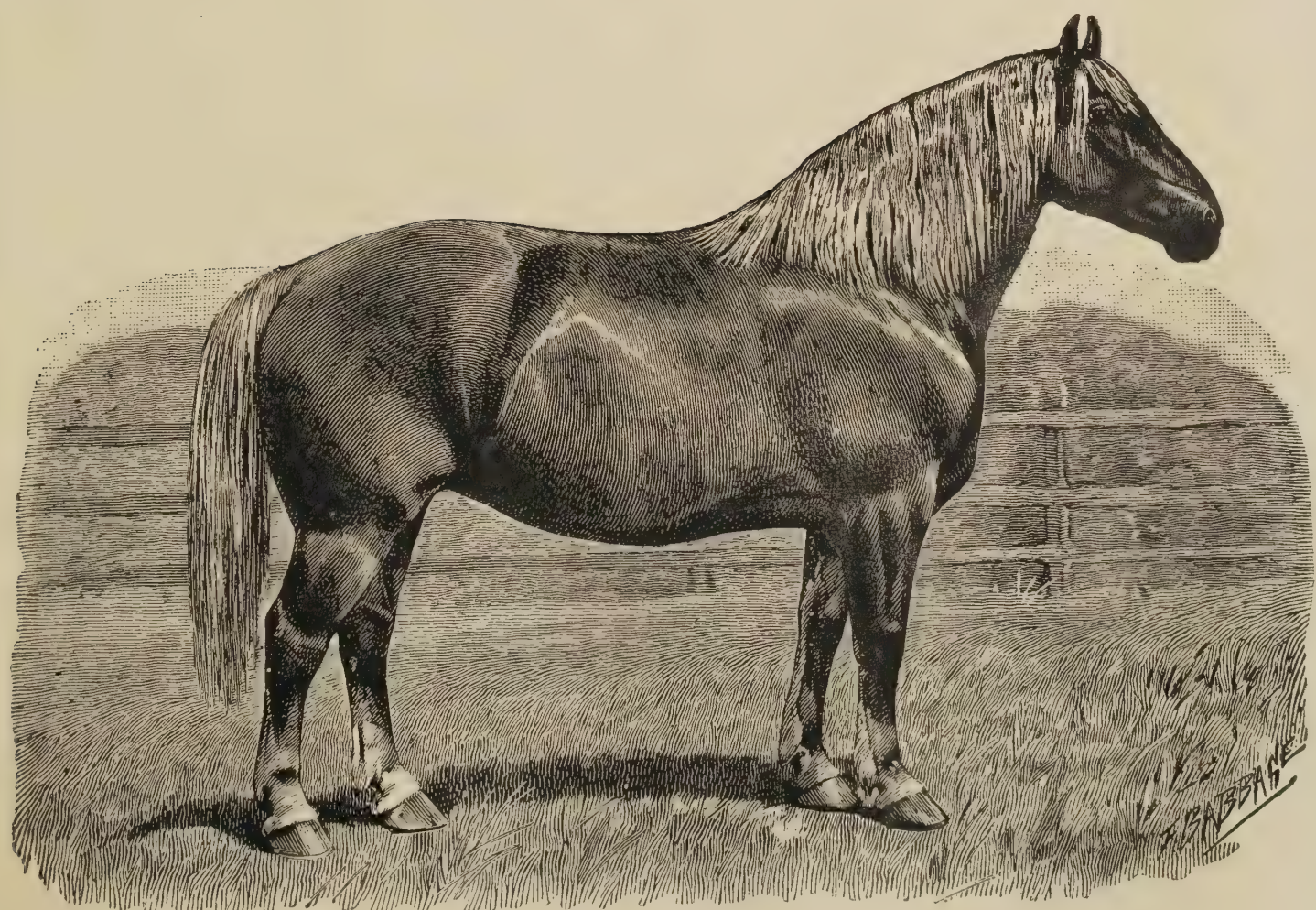
Few breeds of horses have so tenaciously reproduced their salient features of identification, in so far as regards his marked characteristics, as the original race of Suffolk horses. It is perfectly clear, and there is reliable evidence of the fact, that many of the most decided points which distinguished them two hundred years ago are rarely absent in the Suffolks of the present day. The short legs, the roomy carcass, the sorrel colour, the constitution, the length of days, and that inexhaustible perseverance at the collar are still prevalent features in the chestnut of our own time. Whatever the objections to a Suffolk horse may be, no one denies the marked type of outward appearance he invariably exhibits. The produce of the crosses, in some cases, stood for years, but sooner or later they died out, and at the present time there is not a living Suffolk horse which is not descended from the old breed, and, further, there is not a single specimen of the breed now in existence which is not descended from one single source of ancestry—namely, a nameless sire foaled in the year 1768, as is proved beyond dispute or doubt by the pedigree chart in the Stud Book.

The pure Suffolk is not a large horse, but he is thick through him; his bone is much larger than his clean legs would lead a stranger to suppose, and his being so close to the ground makes him look smaller than he is. He is a short-legged, clean-boned animal, of ample size for any agricultural work, and admirably fitted for active town work as well. He should be deep in the carcass, wide in front, square behind, with hard, short legs, close-knitted joints, and devoid of all tendency to coarseness. Unless extremely well put together, anything over 16'1 should be viewed with suspicion. If those who make trial of the breed will keep such a type in their eye, the significant signs of antiquity of origin will take care of themselves. The chestnut colour, the marked capacity of thriving on a scanty diet, and long hours in the collar will be there, and so will the docile temper, the never-ending patience at the dead pull, and the many days so remarkable in the age of the Suffolk horse.

The silver-haired chestnut has been a marked feature in some of the most noted Suffolks—a mixture of white hairs in a bright chestnut coat; but if these silver hairs are plentiful enough to amount to a roan, all Suffolk breeders will reject the horse. Some have a white mane and tail, a characteristic of the original breed, but these are not fashionable, and nothing is so good as the bright chestnut, with mane and tail of the same colour. No shade of this one colour is objected to, nor does the white face or white leg act as an obstacle to registration.—“Live Stock Handbook.” “Heavy Horses, Breeds and Management.”

CITRUS CULTURE.

For the past few years Mr. A. H. Benson, Instructor in Fruit Culture, has contributed many valuable articles to the Journal on orchard work, particularly on the cultivation of citrus fruits. As copies of these Journals were in great demand, there were none available in 1906. Mr. Benson, therefore, embodied the articles on fruit culture in a pamphlet, which was issued in that year. Since then, the industry has been considerably extended, and it was considered necessary to bring previous writings up to date. This work has been completed by Mr. Benson prior to his departure for England, and the latest pamphlet, profusely illustrated, may be obtained, free or charge, on application to the Under Secretary for Agriculture and Stock, Brisbane.



1. SUFFOLK STALLION, "ECLIPSE," 2010.
2. SUFFOLK MARE, "QUEEN OF HEARTS," 3066.

Horticulture.

FLOWER GARDENING.—No. 3.

By THE EDITOR.

PLANTS SUITABLE FOR OUTDOOR CULTURE.

ROSES (*continued*).

What to Plant.

Each rose votary has his own favourites. Selections of best roses have been frequently made by hundreds of growers, but scarcely ever have two lists been alike. We do not intend to enumerate the best roses, but in the list below would-be growers who do not know what to plant will find many varieties which will be hard to beat.

HYBRID TEAS.—Belle Siebright, Lady Mary Fitzwilliam, Mrs. R. Garrett, La France, Duchess of Albany, Kaiserin Augusta Victoria, Mildred Grant, Caroline Testout, Tennyson.

HYBRID PERPETUALS.—A. K. Williams, Jubilee, Mrs. John Laing, Clio, Captain Haywood, Prince Camille de Rohan, Abbe Bramere.

TEAS.—Ernest Metz, Maman Cochet, White M. Cochet, Devoniensis, Seffrano, The Bride, Bridesmaid, Queen Olga of Greece, Souvenir d'Elsie Vardon, Muriel, Grahame, Papa Gontier, Madam Carmody, Marie van Houtte, Alexander of Russia, Catherine Mermet, Auguste Comte, Mrs. Edward Mawley, Mdle. Jules Grobz, Francois Dubrenil, Empress Alexandra of Russia.

OTHERS.—Cloth of Gold (N.), Carl Brunner (P.), W. R. Richardson (N.), Marechal Niel (N.), Souvenir de la Malmaison (P.), Niphetos (T.), Souvenir d'Ami (T.).

CLIMBERS.—Climbing varieties of many of the above-mentioned sorts can be obtained, and will do well. But for spring displays and rapid growth, Fortuniana, Banksias (yellow and white), Fortune's Yellow, and Reine Olga de Wurtemberg are recommended.

SOME GOOD ROSES FOR POT CULTURE ARE:—Provence—cabbage; Moss—common, *Laneii*. (The moss rose is not generally successful on the coast lands.) Hybrid China—Madame Plantier; Hybrid Bourbon—Coup d'Hébé; Hybrid Perpetuals—Anna Alexieff, Caroline de Sansal, La Reine, Françoise Arago, John Hopper, Géant des Batailles; Bourbon—Louis Odier, Souvenir de la Malmaison; China—Cramoise Supérieure, Mrs. Bosanquet; Tea Scented—Devoniensis, Gloire de Dijon, Safranot, Souvenir d'un Ami, Penelope.

The Penelope is a new rose lately raised by Mr. J. Williams, near Brisbane. It has created great interest, and rooted plants have brought high prices. It is a very charming flower of the true Cochet form, very shapely, and so firm in petal that a good bloom will last three or four days after cutting. The ground colouring is white, and a sweet lemon yellow at the base, and deep crimson on the outer petals. There is no rose in which the same two colours are running. Penelopes should be included in any collection.

To conclude this rather long dissertation on the Queen of Flowers, the successful rosegrower of necessity is an unalienable worshipper of the Queen of Flowers, for his appreciation of the pre-eminent blooms leads, by encouraging observation and stimulating attention, to intelligent and systematic cultivation. Some, while admitting the sweet fragrance of the rose and the beauty and luxuriance of a neighbour's garden, get only the thorns instead of the roses,

for with half-hearted work they plant their trees, expecting them, because they are sorts recommended by a successful rose exhibitor, to establish themselves and grow out into floriferous wonders for all the vicinity to admire. But the best results only come from knowledge and a continuity of effort, and it is well that it is so, for it gives the results to the genuine lover, whose motto is "The rose first; spectacular display and exhibitions after." The result is that the true lover eventually gets the best results, and, having the roses, also obtains the display and the competitive successes, discovering more and more as time goes on a suitable and inspiring charm about the rose, so fragile and so sweet, that he is proud to confess with the ancient poet that—

Should Jove appoint some flower to reign
In matchless beauty on the plain,
The rose, mankind will all agree,
The rose the Queen of Flowers should be.

Roses are better when grown in beds or borders specially prepared for them. In mixed borders they frequently do well, but are oftentimes allowed to become practically choked out of all opportunity for development by the juxtaposition of gross-growing shrubs. See that they have ample room. They delight in an abundance of light and air, and yet require shelter from keen boisterous cold winds, and also from hot ones. They will grow in almost any soil, but, generally speaking, do best in a deep rich and rather heavy loam. Stiff, heavy soils can be ameliorated by the addition of ashes, soot, leaf mould, organic manures, and straw, while sandy soils can be changed to the ideal nature by the adding of clayey soil. In the latter, noisette and tea roses do very well. Cut away clean all bruised roots before planting. See that the land is well drained, and yet capable of retaining moisture. A good system of manuring is to apply a good coating of stable litter in form of a mulch, subsequently digging it in.

INSECT ENEMIES OF ROSES.

Roses, like most other plants, have a host of insect enemies, but they may be kept at bay, and even completely exterminated, by the prompt use of remedies. Mr. C. French, F.L.S., F.E.S., Victorian Government Entomologist, mentions several of these pests in a communication to "The Australian Gardener," and also gives the best remedies for their destruction:—

White Scale.

A white scale insect infesting the rose, raspberry, blackberry, currant, and other members of the same orders of plants. Male, winged; colour, light-amber with dark, irregular markings, wings white. Female, wingless, eggs red colour, form oval, and from twenty to fifty under each scale. This serious pest of the rose is one which, if not well looked after, will not only render the plant unsightly, but will kill the latter outright, so that, as in the case of most of our insect troubles, the spray pump must be kept going. Upon the first indications of the presence of this scale, cut the plant as hard back as possible for the time of the year. Get a nailbrush or something of the kind, and, after having burned the prunings, proceed to scrub the thicker shoots, using either a resin compound, kerosene emulsion, or even nicotine and soap boiled together, and with this give the woody parts a hard scrubbing. For the weaker shoots, spray with a well-diluted resin compound or soperine. If the plant be badly affected, take it carefully up during the months of either June or July, cut it back, then immerse the whole plant for twenty-four hours in a solution of tobacco water. Give the plant stems another good scrubbing, and after disinfecting the soil with some lime, or, better still, muriate of potash, replace the plant, and watch it carefully for a time. The white scale is not easy to stamp out, the great secret of success being to constantly watch the plant, and, if the slightest traces of the scale be visible, act promptly.

Looper Caterpillars (Geometrid Moths, Several Species).

The co-called "loopers" are larvæ of small moths, the name of looper having been given to the caterpillars on account of their looper-like attitude when in motion. The female moth deposits her eggs upon the young bud of the rose blossom, and, when hatched, the tiny grub at once commences to bore into the bud. If not at once noticed, the blooms so attacked are done for. The geometers belong to a group of Lepidoptera largely represented in Australia, and included amongst them are many of the worst of our "leaf-roller" pests so well known to the rose-grower. Spray with either white hellebore, weak Paris green, or nicotine.

Red Spider (Tetranychus telarius).

This well-known pest of growers is not, strictly speaking, an insect, as it belongs to the great group of acarids or mites. Still, I have considered it of sufficient importance to include in this article. The red spider is one of the most troublesome, and, in some cases, one of the most destructive, of pests, the eggs remaining both in the soil and on the plants during the whole season. The tiny animals, when fully grown, are red in colour; hence their title. Deterrents are here again in evidence. When the foliage is firm, spray with either quassia, hellebore, or a weak kerosene emulsion. When spraying keep a full strength solution for the soil, as upon examination, especially if the soil be a heavy one, myriads of the tiny beasts are to be found in it, and there remain until the late spring, when they sally out for their work of destruction. Where it can be judiciously done, keep the hose and syringe going, as once the "spider" tackles the foliage it soon spoils the latter's beauty. The red spider must be kept at in the early stages. If the "web" be once formed it is most difficult to destroy the pest without much injury to the plants themselves. Spimo, a great home remedy for spider on hops, might with advantage be tried here on roses as well as on other plants.

Rutherglen Fly (Nysius sp.)

This is a small but formidable pest of the rose-grower. It is one of the tiny species of plant bugs, and is one of the worst of our all-round insects. The perfect insects are winged, and are to be seen in countless millions. When they settle on a rose bloom they at once commence to drive their beaks into the petals, and then the whole of the nourishment required to form the perfect flower is sucked out, the buds being left on the plant shrivelled, blackened, and dying. As these insects congregate in rubbish, it is desirable to mulch the roses with grass, and at daybreak remove the mulching bodily and burn it. The crevices in the soil are also great harbouring places for this pest. The soil should, therefore, be sprayed with a strong (1 in 8) kerosene emulsion. When the pest makes its appearance it must be tackled at once, and always either in the morning, before the sun gains power, or after dusk. In the case of roses it will be difficult to use any material strong enough to kill the insects without damaging the tender foliage of the rose. Smoke fires, although successful, is but a half-hearted way of dealing with the pest, for instead of destroying the insects you drive them on to your neighbour's property, where they hibernate until the following season.

The Rutherglen fly is a hard nut to crack, and will look at the ordinary treatment meted out to insect pests as merely in the light of a huge joke, and will even thrive upon a spraying with undiluted fusil oil. I find, however, that the beast does not like either quassia chips or pyrethrum insecticides, so I would recommend these materials as worthy of a trial.

Light-brown Apple Moth (Cacæcia responsana).

This small but very destructive moth is, next to the codlin moth, our most dangerous insect pest of the apple-grower. The perfect insect is yellowish-brown, the grubs being not unlike those of the codlin moth. As in the

former species alluded to, the eggs are deposited upon the face, also in the folds of the rose petals, and the grub, when hatched, eats into the bud, thereby causing it either to fall off the tree or is otherwise rendered useless.

In the case of this pest deterrents should be used, and for this purpose the pyrethrum insecticides dusted on the young flower buds are very useful. Occasional sprayings with a weak (1 in 20) kerosene emulsion has also been used by many with much success. This moth frequently deposits its eggs about dusk and early in the morning, and, owing to the great damage it does, is well worth watching. I have seen a dozen or more buds ruined in a single night, and, as the trouble is not at once noticeable, it will be seen that careful observation and prompt treatment are necessary to attain success.

Mealy Bug (Dactylopius).

The Mealy Bug of gardeners is a great pest, especially as it attacks the roots as well as the branches of the plant, and will be quite at home in soil of any kind, especially heavy soil. This pest is more troublesome to persons who force roses either in pots or in tubs. The bug does not appear to do much harm to roses when they are planted out of doors. When this insect appears upon the plant above ground, spray with kerosene emulsion, and in spraying for this pest especially the liquid must be forced on to the plant with as much force as is consistent with the constitution of the rose that is to be treated. When the bug is on the root of the plant, disinfect with either bisulphide of carbon placed in the soil by means of an injector or sulphate of iron. In planting roses on old and used land, great care must be taken to treat the soil before planting with some muriate of potash, which is almost a specific against peach aphid when at the roots.

Cut Worms (Euplexia nigerrima and others).

Cut Worm is a terrible pest in rose gardens, the habits of the parent mother being mostly similar to that of the preceding species. The larvæ or grubs are of a dirty greenish-brown colour, and are fairly active when at their work of destruction. This grub is a most voracious feeder, and will ruin a large number of rose buds in a very short space of time. It will also attack the leaves.

The moth of the species here named is black, with a few white markings. We have reared it from the rose and carnation buds. Other noctuid moth grubs will also tackle the rose, but this is, I fancy, the worst species for florists' flowers.

Spray with white hellebore or nicotine. A good plan is to mix bran, arsenic, and treacle together into a paste, and at dusk lay pieces here and there amongst the plants.

Formula—50 lb. bran, 12 lb. arsenic, 6 lb. treacle.

Stick Case Moths (Metura and Entometa).

These insects, whilst in the larval state, are a great trouble to growers. A very few of the grubs, with their singular stick nest, will soon make short work of the foliage of a rose or any other plant which they select for attack.

The perfect insect is a small moth. The female is quite destitute of wings. It both makes and inhabits the case above mentioned. The males, although common, are but rarely seen, and are best captured by means of placing a female under a wire meat cover or a sieve, and in this way they are easily attracted.

As an illustration, I may say that for nearly fifty years I have been collecting insects, and have only secured two male specimens of these moths in the ordinary way. Fortunately, these grubs are easily destroyed, and a few applications usually suffice for that purpose. Take 1 lb. Paris green (paste form is the easiest), 4 lb. lime, mix and dilute for most plants, say, 1 gallon of

the mixture to 160 gallons of water. The grubs being leaf-eaters are at once poisoned by the material sprayed on to the parts affected.

In the case of roses, it is seldom that the grub attacks the foliage until the latter is well ripened, so that the mixture can be used at a fairly strong rate. There are a few other and smaller stick case insects which go for the rose, but these are not sufficiently numerous to do any considerable damage.

Jassid (Jassidæ).

We now come to a tiny green cicada beast, which, for its size, bids fair to become one of the rose-growers' worst pests; at least, when the plants are in bloom. This insect puts in an appearance in the hottest weather, and, similar to the Rutherglen fly, simply swarms on the leaves as well as the blooms. Comparatively, this insect of recent introduction as a garden pest, although it is supposed to be a native of this State. The group to which this insect is allied contains some of the most extraordinary forms of all insect life. Let us hope that this beast may soon go hence. Deterrents in the way of quassia, hellebore, emulsions of all sorts, and also care as to the manure used, will have to be adopted. Trapping should be done soon after daylight, or after the sun has lost its power.

Fungoid diseases often appear, when the foliage must be dusted with sulphur, either dry or mixed in a solution of soft soap, and sprayed or painted on to the plants.

THE SCHOLARS' GARDEN AND WHAT WAS DONE WITH IT.

By A. C. NEATE (late Melbourne Botanic Gardens).

When visiting the A.N.A. Exhibition, in February, 1907, we inquired into the subject of school gardens in Victoria, and were afforded some interesting information on the matter by Mr. Ambrose C. Neate, for many years associated with Mr. Guilfoyle, the Curator of the Melbourne Botanic Gardens. Mr. Neate writes, enclosing a letter from two young horticulturists, "Frank and Florrie," who appear to have profited greatly by his instruction. He says:—

"The accompanying sketch of the 'Scholars' Garden, &c.,' is in the main the outcome of a talk—awhile back—with a large gathering of both lads and lassies of from eleven to fourteen years of age, in one of the public schools here; and, though delivered in this conversational form, with a view to eliciting responses from the young people, this object was the more certainly attained, because the writer exhibited during the talk quite a score of (Vick's New York) coloured plates of well-formed garden flowers, on which also remarks were made and questions asked.

"The interest seemed to be so well maintained during the three-quarters of an hour's converse, and proved what has long been testified by others, that the love of flowers is inherent, and only needs a little encouragement to prove it a welcome aid to Christian conduct with associated education both in the public schools and 'home' life of our boys and girls.

"If you would approve further notes, they (Part II.) will be sent, say, as now, for the perusal of the Queensland cousins of 'Flora' and 'Frank,' as to the operations likely to be entered upon after the summer heat has vanished, and in preparation thereafter until spring time approaches.

"These notes will be partially suggestive, or, at any rate, they will be perused (in part from my original jottings) to show sympathy with the young people as to gardening pastimes, linked with and leading up to their personal interest in floriculture generally; and, where possible, associated with such encouragement as may (will?) be forthcoming in connection with their very own school garden.

"THE SCHOLAR'S GARDEN AND WHAT WAS DONE WITH IT.

PART I.

"*The Character of Our Ground.*—It comprises the family home, and has a garden plot in front and at the side, with a spare piece at the back; the soil is a sandy loam, about 18 inches deep, with a clay subsoil.

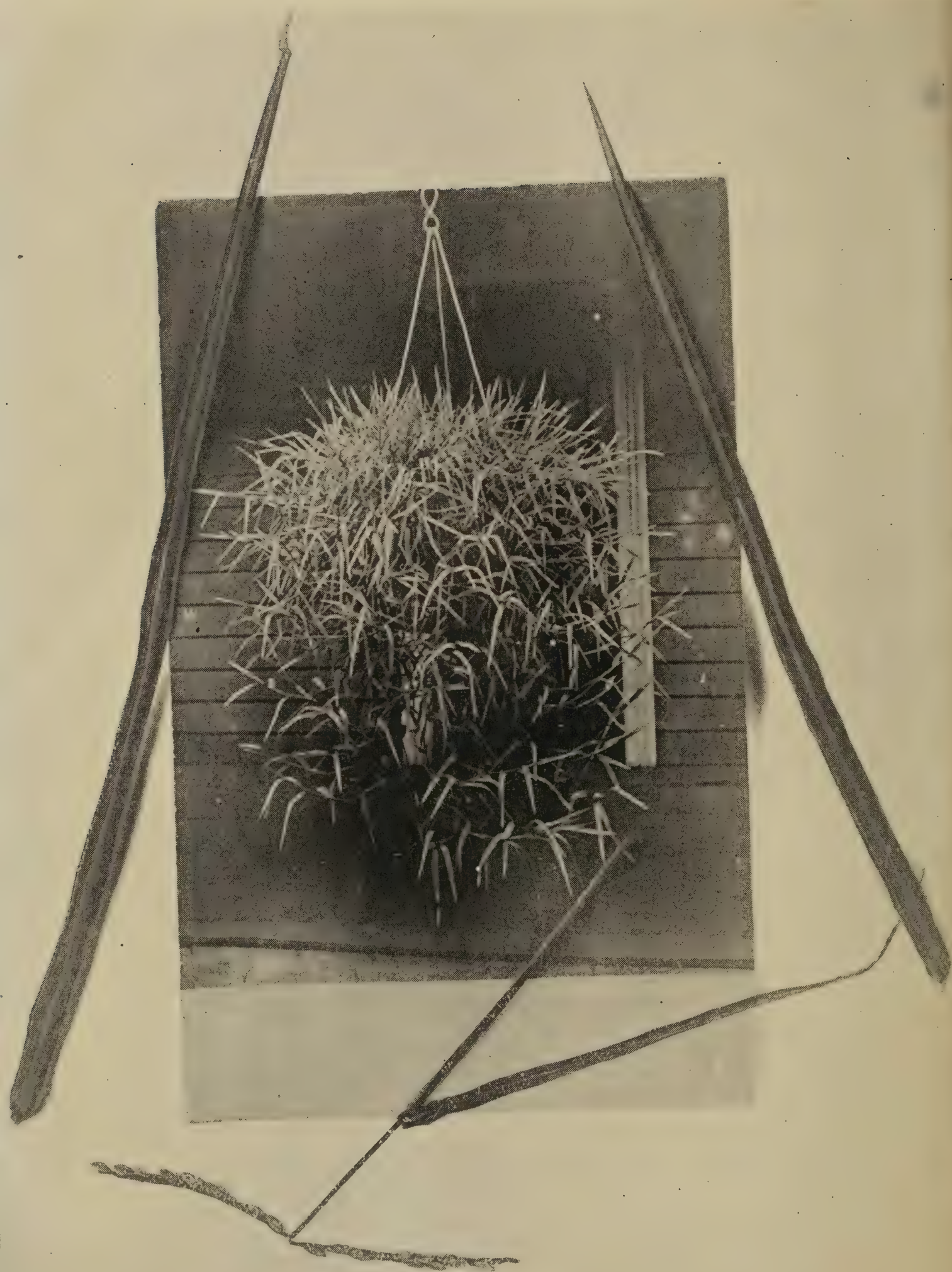
"My father said that my brother and myself might have a piece which is near the fence—about 36 feet long by 12 feet wide, with a partly sunny aspect—but on condition that it shall contain not only pretty flowering shrubs, but be also plentifully stocked with annuals and perennials in season, and that it must be kept clean and quite free from weeds; and, further, that we may have all the spare water available for the summer time with supplementary help from the hose and water taps when necessary.

"*Well, about Our Commencement?*—We had some trouble as to the plan, and asked father's advice. He at once marked out the ground for us, and gave us a good cheery young gardener for a whole day to dig over the plot, and level it just nicely so as to leave us but little to do besides putting in the plants and seeds; also a good supply of cuttings; and as there was still fully two hours' time after the digging the gardener gave us much useful help and guidance as to our little plantation and its future possibilities. I must not forget to say we were fortunate in this our first garden to have in it at regular distances—standing well back—a fig-tree, an apricot, a loquat, and a pomegranate, all of which are, the gardener says, sure to give a nice lot of fruit next season, quite as acceptable in their way as the flowers of the other plants will be. We then planted a number of roses, which father gave us, and this proved sufficient for our first day's efforts in our very own little garden. Afterwards, during a whole week we made quite a large addition of plants, which were given to my brother or myself by friends of our father's from their pretty gardens at St. Kilda and Camberwell. These plants were of the following kinds:—Geraniums in variety, daisies (pretty pink ones), carnations, perennial phloxes, violets, hydrangeas, echeverias (various kinds), and some cuttings of three or four kinds of climbing pelargoniums, twelve kinds of roses (cuttings), and a good many other things, such as veronicas, blue, silvery-leaved, and mauve-flowered; also a supply of seeds of asters, phloxes, zinnias, and linarias for sowing in the spring.

"The way we put in the roses and other shrubby plants was at distances of about 4 feet apart, and standing well back in the bed; then we planted the smaller growing (dwarf) plants in the front of the border; some of these were verbenas, oxalis, cowslips, primroses, and here and there a pretty blue pentstemon, and a nice little set of a pink-flowered plant called by the gardener *Heuchera sanguinea*; whilst in the front we made—it multiplies very quickly—a pretty moss-like edging, rich emerald green, and we found it most suitable; we may add, too, that it was much admired by our visitors. Its name is, so father told us, *Spergula pilifera*. When one treads on this, it is as if the feet would sink in its pile carpet-like cushioning. It likes the shade to some extent, and stands a rather limited supply of sunshine; but it must have, we find, a fair amount of water put on in the evening as a matter of necessity to save sun-scorching.

"I may add, that in addition to the climbing roses and pelargoniums for the fence at the back of our plot, we added two or three passion fruit plants, some Tecomas (McKenii, and Jasminoides), also a few of *Cobæa scandens* (which we first raised from seed in a pot). The passion fruit climbers we raised from seed out of a small purchase of this fruit in a Glenferris road produce shop.

So far as we have gone with our little garden, father says, we have made a good deal of progress—everything now for the past two or three months has done very well, indeed; and he added, as he kindly tied up some of our



PASPALUM DISTICHUM, *Linn.*, var. *TURLEYI*, *Bail.*

climbers against the wire netting and trellis work, that if we waited patiently the shelter given by the climbers against the strong winds both hot and cold would, with our care in other respects, give a good show of colour as varied as the rainbow from the many flowers now growing so well, and enable us to not only supply the house or a friend now and again with a choice supply of blooms, but also to give us some very practical knowledge, of which, as to many plants and flowers, both my brother Frank and myself (Flora) were quite ignorant at the commencement of our pleasant work of partnership as amateur horticulturists in our spare time, principally either before or after school hours. And we found that we enjoyed both our meals and nightly rest the better, to say but little of the improved interest we took in our lessons, and the outcome in every way proved satisfactory, so our father and mother, also our many friends, tell us. Anyway, a good many of our fellow scholars come to see the garden frequently, and we know that some of them think of doing their share of flower culture, too, in their own ground, with the hope of doing as well or better than we did. Of course, we wish them success, but they will have to work hard to do even as well as we have done; at least we believe so from our successes, to say nothing of our many failures, for which, of course, father says (with a twinkle in his eye) we are at liberty to blame the climate! Well, we think he is right, for the terribly hot summer we have been suffering from for many weeks past has also told badly on other gardens than our own all over the suburbs of Melbourne.

"We commenced our little Malvern garden early last spring (September), and we are still enduring our summer (February), being thankful that on the whole our floral treasures have mostly survived and thriven, because (in addition to one or two welcome downpours of rain) the demand for extra care has not been denied our much loved little garden by my ever helpful brother and myself.—'FRANK AND FLORA.'

"P.S.—As soon as we can get shade enough from the climbers, which will partially cover the summer house the carpenter has made, mother and father, ourselves, and friends will often read, talk, or rest there in full view of our floral success.—'F. and F.'"

Botany.

CONTRIBUTIONS TO THE FLORA OF QUEENSLAND.

By F. MANSON BAILEY, F.L.S., Colonial Botanist.

Order GRAMINEÆ.

Paspalum distichum, Linn., var. *Turleyi*, Bail. (Plate XVI.) This variety differs only from the normal form of the well-known "Water Couch" in that the leaves are striped with white, which gives to the plant a very attractive appearance, and, as may be seen by the illustration, makes it suitable for hanging-basket work. It was discovered by Mr. F. W. Turley, nurseryman, Toowoomba, in a swamp near that town.

Tropical Industries.

TEA CULTIVATION IN THE UNITED STATES.

By GEORGE F. MITCHELL, Scientific Assistant in Tea Culture Investigations.

A little more than 100 years ago the French botanist Michaux successfully planted the first tea in the United States. This was at Middleton Barony, on the Ashly River, about 15 miles from Charleston, S.C.

In 1848, Dr. Junius Smith retired from an active life in London to ruralise and plant tea on his estate near Greenville, S.C. Both plants and seed were imported, and in an article in the *American Agriculturist* for 1851 Dr. Smith stated that his plants were doing finely, and had withstood a snow 8 to 9 inches deep on 3rd January of that year, and he added:—"I cannot help thinking that we have now demonstrated the adaptation of the tea plant to the soil and climate of this country, and succeeded in the permanent establishment within our own borders." Dr. Smith died soon afterwards, in 1852, and his plants, without protection, soon disappeared.

As early as 1858, the United States Government, through the Commissioner of Patents, sent Mr. Robert Fortune to China to obtain seeds to be planted in this country. In less than one year's time tea plants were distributed among private persons in the Southern and Gulf States, who later reported that the plants had been successfully cultivated by them, and in a great many cases that tea had been made at their homes.

During the year 1880, Hon. William G. Le Duc, then Commissioner of Agriculture, employed Mr. John Jackson, who had been a tea planter for fourteen years in India, to carry on experiments to test the feasibility of growing and manufacturing tea in this country. The experiments were at first conducted in Liberty County, Ga., on a place bought by the Government from Dr. Jones, who had planted tea there in 1850.

Later, 200 additional acres of land near Summerville, S.C., were leased for twenty years from Mr. Henry A. Middleton to carry on experiments there. Seed was imported from Japan, India, and China, and was also collected from the few plants then surviving in the United States that had been previously sent out by the Patent Office. From these seeds a small area was planted in tea, but before the plants had a chance to make very much growth Commissioner Le Duc was succeeded by Commissioner George B. Loring, who thought it best, because of the illness of Mr. Jackson and for other reasons, to abandon these experiments.

Since then the cultivation and manufacture of tea on a commercial scale has been practically demonstrated, in co-operation with the Bureau of Plant Industry, by Dr. Charles U. Shepard, at his "Pinehurst" tea gardens, near Summerville, S.C., where about 100 acres are planted to tea, of which the area in bearing yields about 12,000 lb. of dry tea each year. One of the gardens has yielded as much as 535 lb. of dried tea to the acre during a single season.

Although the distribution of the many plants and the establishment of the many home tea gardens in the South were steps towards encouraging the people to manufacture their own tea, these gardens soon died through lack of interest, because the important point of teaching the growers how to pluck and make the leaves into tea had been neglected.

Experiments were conducted during the summer of 1905, with a view to developing a simple process by which both the green and the black teas can be made successfully by any intelligent person with only such utensils as are found in every kitchen. These experiments indicate very strongly that the result sought can be accomplished, and that farmers and others who have enough garden space to grow the plants for use or for ornamental purposes

can with very slight expense and trouble make enough tea for their home consumption. It is a significant fact that much of the tea grown in China is planted in the corners and waste places of farms.

CLIMATE REQUIRED BY THE TEA PLANT.

The climate of the Southern and Gulf States is in general admirably adapted to the cultivation of the tea plant. Although the rainfall is much less than in a great many tea-producing countries, the average annual temperature is lower, causing less evaporation and consequently requiring less rainfall. The cultivation of the tea plant can safely be risked where the temperature seldom falls below 24 degs. Fahr. and never goes below zero, and where the annual rainfall exceeds 50 inches, 30 inches or more of this precipitation occurring during the cropping season.

SELECTION OF SOIL.

A well-drained, friable, and easily penetrable clay loam or sandy loam containing a large amount of organic matter is best adapted to the cultivation of the tea plant. Very tenacious undrained soils or very sandy soils that lack water-retaining properties are not adapted to the growth of tea; neither will the plants tolerate stagnant water in the subsoil. The plants being of sub-tropical origin need as much protection from the cold as possible; therefore, much better results can be obtained where a southern exposure with an abundance of sunshine is selected.

PLANTING.*

The seed should be planted in the autumn or winter, just before a rain. A convenient place protected from the prevailing winds by a fence, a wind-break, or by the side of a house should be selected and covered with a frame about 6 feet above the ground. This frame should have cracks about $1\frac{1}{2}$ to 2 inches wide, so as to admit only a little of the direct rays of the sun. It can be made from any waste lumber or loosely woven wire netting covered thinly with straw of some kind.

The soil should be pulverised to a depth of at least 8 inches and entirely freed from grass and roots. The seed should be placed 4 by 4 inches apart in little holes about $1\frac{1}{2}$ inches deep. One seed should be put in each hole and covered by simply raking the surface over gently with a rake.

The nursery bed should be covered uniformly with some kind of straw to protect the seed from the cold and also to mulch the bed. Pine straw or needles, if procurable, will be found excellent for this purpose. As the plants begin to shoot above the ground, a little of the straw should be removed from time to time and the nursery thoroughly weeded. This should be kept up until autumn, when the straw should be permanently removed and the top of the frame dispensed with.

When only a few hundred plants are to be raised from seed, a large box, 12 inches deep, provided with drainage holes and kept protected from the direct sunlight will suffice. In very dry weather, water should be applied to the nursery bed or box either early in the morning or late in the afternoon, when the sun is not very hot.

Seedlings are generally transplanted in the autumn or spring after a heavy rain or when the soil is quite moist to a considerable depth. The plants may be set out twelve to eighteen months from the time of sowing the seeds, although it does no harm to let them remain in the nursery two years, but in such cases their tops should be slightly pruned to prevent them from growing too tall and slender. The plants can either be set 2 feet apart in hedgerows along fences or walks, where they can serve for ornamental purposes, or they can be placed from 2 to 5 feet apart in 5-foot rows.

* For information concerning the vegetative propagation, veneer grafting, and herbaceous grafting of tea, see Bulletin No. 46 of the Bureau of Plant Industry, entitled "The Propagation of Tropical Fruit Trees and other Plants," 1903, pp. 19-23, and Pls. VI. and VII.

The soil should be thoroughly pulverised by spading or ploughing as deep as possible; then it should be levelled, and holes, 9 to 12 inches deep, made at the proper distances with a trowel or spade. The plants should be placed in the holes with the tap root straight down. In cases where this cannot be accomplished, owing to extreme length, the root should be pruned with a knife or other sharp instrument. The earth should be firmly compressed around the plant, which is best done with the foot. If the soil is rather dry, and it seems desirable to water the plants, this should be done.

CULTIVATION.

Frequent and shallow cultivation that will maintain a loose mulch around the plants, as well as keep them free from weeds, is best during the spring and summer, when evaporation is very pronounced, because this shallow mulching breaks the capillary tubes in the soil and lessens the evaporation. In the autumn, after the plucking season is over, the soil should be turned up thoroughly to a considerable depth with a spade or a plough, so that oxidation and disintegration will take place during the winter, when there is very little evaporation.

Commercial fertilisers or barnyard manure should be applied late in the winter or early in the spring and well worked in around the plant, but not too near the stalk, because the minute feeding roots which take up the plant food extend some distance from the stem.

PRUNING.

Every February or March after the plants are three years from seed they should be pruned down so that only two eyes are left on the preceding year's new wood. This can be done with either knives or pruning shears, making a clean slanting cut one-half inch above the top eye that is to remain.

Sometimes the plants get very thick after five or six years of service and fall off in their yield; in such cases they should be "collar pruned"—that is, pruned to the ground by sawing off the stems. This causes them to put out an abundance of new shoots, which can be picked late in the same season.*

In all cases the prunings should be buried in the middle of the rows, as they have considerable manurial value.

PLUCKING.

In plucking, which in the Southern States should begin about the first of May and continue until about the middle of October, only the bud (pekoe tip) and the first two or three leaves should be taken, as the other leaves are generally too tough to make good tea. This is done by pinching off the stem with the thumb nail and first finger just under the last leaf to be plucked. The bushes are generally plucked every seven to fifteen days, but this is determined by the development of the tender shoots, care being taken that they do not become too tough before plucking, because then they do not make good tea.

Leaves that are slow in developing always make a better flavoured product than those that grow rapidly, so a small yield is always compensated for by a more highly flavoured tea.

CURING.

In the processes described, the use of a thermometer and other technical apparatus has been entirely eliminated, and their places supplied by the senses of touch, smell, and sight. The importance of keeping the stove and kitchen utensils that are to be used absolutely clean and void of odour of every descrip-

* On this point Mr. Showers writes:—"The Cinnamara experiment plainly shows that when such heavy pruning is undertaken (and I fully agree with you that this should only be done when absolutely necessary) the process should be commenced by heavy manuring the year previous to pruning, and continued or maintained by green crops or other manures every year until the tea has been brought up to a full yield in the fourth or fifth year."

tion cannot be too strongly stated, because dry tea readily absorbs any odour that may be present. As only a few utensils are required, it is best to obtain new ones and keep them for this purpose only. All that is necessary is a 4-quart double boiler (a sauce pan with a hot-water jacket), a large pan, preferably agate-lined, a large wooden spoon or paddle, and a kneading board where the use of a clean kitchen table cannot be had.

BLACK TEA.

The leaves are brought in the day before they are to be made into tea, and are spread very thinly and evenly on a clean table or floor, where they are allowed to remain from twelve to twenty-four hours, when they will lose about one-half their weight by the evaporation of moisture, become very soft and flaccid, and feel like an old kid glove. In this condition they are ready for rolling. When withering is near completion, the leaves should be watched very carefully, because if allowed to go on too far they become parched and unfit for rolling.

About half a pound of the withered leaf is rolled or kneaded from twenty-five to thirty minutes on a clean table or kneading board. The operation is similar to the kneading of dough. The rolling should be very light for the first ten minutes, so as to allow the leaves to begin to twist or take on the "roll"; then the pressure should be gradually increased until all that can be exerted is applied, so as to express the juice (which should be sopped up with the leaves) and give the leaves a tight twist. This tight rolling not only makes a strong tea, but helps to preserve the flavour. Very often the leaves will be a little overwithered and rather brittle, in which case water should be sprinkled on the withered leaves until they are rendered soft enough to roll.

After rolling, the leaves are formed into a "ball" and allowed to remain in a cool and preferably damp place from three to six hours to ferment. The end of this stage in the process is indicated by the ball turning a yellowish copper colour, which can be seen when the ball is broke open. The raw herby scent has also changed to an agreeable fruity one. This stage must be watched carefully, because if allowed to go too far the leaves become sour and unfit for tea.

After fermenting, the ball is broken up and spread about half an inch thick in a large clean pan (preferably of agate ware) and placed in the stove oven to dry. The pan should be removed at intervals, and the tea turned. This should continue until the tea is very brittle to the touch and a very slight odour of tea is given off. The oven should not be too hot during this operation, as too much heat prevents uniform drying. The tea is now ready for use, and should be placed in air-tight tin boxes or cans.

SUN-CURED BLACK TEA.

Sun-cured black tea is the same as the ordinary black tea, except that the withering is done in the sun in a much shorter time, and produces a tea more acceptable to the average taste.

The freshly-picked leaves should be spread very thinly and evenly on trays made by tacking cloth on wooden frames of any convenient size, or they may simply be spread on cloths, which in either case should be placed in the sun until the leaves become very flaccid. This will require from one and one-half to three hours or more, depending on the intensity of the sun's heat and the humidity of the atmosphere. During this operation the leaves should be turned at intervals, so as to induce uniform withering. The further procedure is identical with that already described for the black tea from the point of withering.

This tea is generally made during the months of July and August, when the heat of the sun is very intense.

GREEN TEA.

The green tea is made from the same leaves as the black, although some varieties are best adapted to make each of these respective kinds. The green-tea process is the same as that for making black tea, except that instead of withering from twelve to twenty-four hours and fermenting from three to six hours (when oxidation takes place, which renders it black) the green leaves are quickly brought in and placed in a covered double boiler—that is, a saucepan with a hot-water jacket (1 lb. of leaf to a 4-quart boiler)—and allowed to remain surrounded by boiling water from seven to nine minutes; the cover should be removed and the leaves stirred at intervals. This will render the leaves very soft and flaccid, ready for rolling. During this rapid process the oxidising agencies of the leaf are sterilised by the boiling water and steam in the hot-water jacket surrounding the leaves, and the production of a green tea is rendered possible. These flaccid leaves are rolled in like manner to the black tea for about ten minutes, being stirred at intervals until they lose some of their moisture and become sticky; then they are again rolled from fifteen to twenty minutes under all the pressure that can be applied. After rolling, they are immediately placed in the oven in a pan and turned at intervals (similar to the black tea) until they are dry and brittle to the touch and a slight scent of tea is given off.

HOW TO PREPARE TEA FOR DRINKING.

Attention must be called to the fact that ordinarily tea is not drawn properly, which not only makes it less palatable than would otherwise be the case, but also makes it very deleterious. Chemically, tea leaves yield principally thein and tannin. The former is the mild stimulant that is sought, while the latter should, as far as possible, be avoided. The thein is very soluble, and nearly all dissolves in water that has been brought to the boiling point and allowed to remain on the leaves three or four minutes, whereas if the infusion be longer extended only a little more thein is extracted, but much more tannin.

To make tea properly, bring freshly drawn water to a boil, pour it on the requisite amount of tea in a previously scalded pot, and allow it to remain covered from three to five minutes; then decant or strain into another receptacle. The spent leaves should not be used again, because practically all the stimulating ingredient has been removed, and that which is left is very deleterious to health.

CONCLUSION.

The cultivation of the tea plant in home gardens is not only profitable, but a great deal of pleasure can be derived from it at the same time that the use of the much adulterated foreign article is avoided. This is often found to contain Prussian blue, indigo turmeric soapstone, and leaves of other plants than tea, some of which are injurious to health.

In the autumn this beautiful evergreen plant is covered with handsome, fragrant, whitish flowers having a golden yellow centre, making it an excellent ornamental plant.

The children as well as the older members of the family may derive abundant pleasure in plucking and making the leaves into tea, although the process is so simple that this work can easily devolve upon any intelligent servant.

The crop of an average tea bush is about 3 oz. of cured tea during the picking season, so that 100 plants will yield about 18 lb. a year. As 1 lb. makes from 350 to 400 cups of tea, fifty plants should furnish a cup of tea apiece to a family of nine for every day in the year.—U.S. Department of Agriculture, Farmers' Bulletin 301.

[This paper is of interest as giving the history of tea in the U.S.A. and as showing the line the Department of Agriculture is taking up; one which, if well pushed, may reduce the Southern American demand for tea.—Ed. "Tropical Agriculturist," Ceylon.]

TROPICAL AGRICULTURE IN CEYLON AND INDIA.

(Extracts from a Report by Mr. H. Newport, Instructor in Tropical Agriculture, Kamerunga.)

It will be remembered that last year Mr. H. Newport, on recovering from a severe illness, was granted leave of absence for three months to regain his health by a visit to Ceylon and India. During his absence Mr. Newport has been busily engaged in inquiring into the various phases of tropical agriculture as they present themselves in the countries mentioned. He writes:—

In Ceylon, on my way to India, I called on the Honourable Hugh Clifford, Chief Secretary to the Government of Ceylon, and had an interesting conversation with him, chiefly *in re* labour for tropical industries in tropical countries. This gentleman kindly gave me a letter of introduction to Dr. Willis, of Peradeniya Royal Botanic Gardens, Kandy, and I accordingly proceeded to Kandy by rail and by trap to Peradeniya. Dr. Willis kindly gave me a good deal of his time, and conducted us over the grounds, especially the experimental portion of the gardens, across the river, to which ordinary visitors are not admitted. A description of the Botanical Gardens, magnificent and complete as they are, would be out of place in this report; the experimental section, however, was replete with interest. Extensive experiments were being conducted with many tropical products, particularly in connection with cocoa, rubber, coffee, cocoanuts, &c. Especially noticeable were the fine buildings in the Experimental Station, including laboratory, experiment rooms, drying rooms, large stores, power house, and complete machinery for the drying or preparation of products such as cocoa, coffee, rubber, &c.; for crushing and even distilling oils, from heavy oils such as castor oil to volatile oils such as citronella or lemon grass. Records and museum specimens were in the Director's office buildings. Similar ample storage and drying rooms for tropical products, especially in districts with heavy rainfall, are very necessary and requisite, though at present, in this country, largely conspicuous by their absence. Complete machinery also for artificial drying with hot air and fans, &c., as well as for preparation in marketable quantities, is a great desiderata, and would be invaluable in this country for purposes of complete and practical demonstration in encouraging the establishment of tropical industries. With regard to machinery for rubber, I am reporting especially and separately.

In these experiment plots, which in themselves must cover well over 100 acres, especial attention is paid to matters of culture as well as numerous methods of harvesting the products.

In Southern India I was fortunate in being able to meet Sir Frederick Nicholson, I.C.S., K.C.M.G., the greatest authority on agriculture in the Civil Service of India, who also gave me a great deal of time and a fund of information on cultural matters.

On the Shevaroy Hills, in the Presidency of Madras, I also met Mr. A. G. Nicholson, one of the most successful planters of Southern India, and the first to undertake the cultivation of rubber on a practical scale. Mr. A. G. Nicholson very kindly showed me over several of his estates, especially that of "Hawthorn," from which his Pará rubber biscuit obtained a first-prize gold medal at the recent Rubber Exhibition in Ceylon.

In Madras I carried a letter of introduction to the Hon. J. N. Atkinson, I.C.S., and was introduced by him to the Director of Agriculture, and also to the Director of the Horticultural Society's Gardens. Over these latter magnificent gardens I was thus enabled to see, under the most favourable circumstances, and found the rubber experiments most interesting, especially in connection with the giant creepers—species of *Landolphas*.

To arrange to go over rubber plantations in Ceylon, and to see the inner workings of factories, &c., is no very easy matter, and correspondence in an effort to obtain this privilege took some time.

Returning from India to Ceylon, however, I interviewed the manager of Messrs. Walker, Sons, and Company, agricultural implement and machinery manufacturers, of Colombo, Ceylon. This gentleman was most courteous and kind, affording me considerable information regarding rubber-tapping and other implements, and introducing me to Mr. Michie, the firm's engineer. Mr. Michie is the inventor and patentee of numerous machines, appliances, and implements, and is himself interested in rubber culture. He took me over Messrs. Walker and Sons' extensive workshops, where I was especially interested in the various rubber machines in course of construction and completed. Mr. Michie kindly introduced me to Mr. Golledge, owner of one of the largest estates in the island, thus enabling me to see the rubber machines actually at work.

Mr. Golledge's estate is at Gikiyanakanda, whence I proceeded by rail to Takura, and thence by trap. This estate had the most complete and up-to-date machinery and appliances for rubber manufacturing, and by Mr. Golledge's kindness I was enabled to see the complete processes, from tapping the trees and collecting the latex to packing the dried rubber for export to the Continent. The principal machines required for proper rubber treatment are the washing machine and the coagulating machine. Matters relating to the construction, working, prices, &c., of which I fully investigated, and in a separate report propose to submit suggestions to the Department regarding the obtaining of either full-sized or reduced models of which, for use and demonstration in this country.

I may here note that while great strides have been made in the matter of culture and preparation of rubber, and in connection with many other important tropical products, I was agreeably surprised to find the Department's work in tropical Queensland was in many respects as advanced and up to date as I found it there. Of course, in extent, owing to want of labour in field culture, and through want of room, machinery, and financial support, it is on a far smaller scale here. The line of work, also, as was to be expected, in many respects materially differed, as the objects aimed for in the experiments varied, but in many directions similar work, with but slightly differing results, had been simultaneously carried out. In tapping rubber on the estate above mentioned, the "Michie-Golledge" knives were, I found, universally used. This knife is a collaborated invention of the two gentlemen above referred to. Many varieties of knives are used in different parts, and some estates use several different kinds. Messrs. Walker, Sons, and Company have a most complete collection of tapping appliances, including knives, among which is one—the "Pask-Holloway"—the collaborated invention of Mr. G. W. Pask, recently of Melbourne, and one of the first to plant rubber in North Queensland (Castilloa, at Stratford, Cairns), and Mr. Holloway, a well-known and large estate owner and planter in Ceylon.

The cultivation and production of plantation rubber is, in the opinion of the best authorities in Ceylon, going to become a large and valuable industry. The industry is receiving the most careful consideration of experts in every branch, and all possible assistance from the Agricultural Department of the Government.

Space will not permit of my referring in this report to many tropical industries observed in their various aspects and trials and experiments inquired into and noted. I would especially remark, however, that experiments and trials of North Queensland samples of cotton in South India and Ceylon have not been universally successful.

A new product, called "Cocotine," was noted, manufactured by a simple process at Pondicherry from cocoanut oil, that appeared to me might be of use in this country, where but little use is made of the cocoanut, and copra as a marketable product is almost prohibitive, owing to the high rates of labour.

This "Cocotine" is in substance a thickened oil, prepared by having certain chemical elements in the natural oil, which cause it more or less quickly to become rancid, removed or counteracted. Cocotine is largely coming into household use in India and Ceylon as a cooking medium, being more satisfactory than any of the ordinary cooking oils, cheaper than most, and materially cheaper than lard or butter.

I obtained one sample tin, which I submit herewith for the inspection of the Department. I would suggest that it be submitted to the Government Analyst, with a view of ascertaining the chemical treatment to which it has been submitted or that may be required to make it here, and the probable cost of so doing. A large market exists in the East for this commodity, and, in view of the comparatively high cost of lard here, probably a large demand would soon result within the Commonwealth.

The tins, such as submitted, are sold in Ceylon at 45 cents, equal to 7 1-5d., and in South India from 7d. to 8d. according to distance from cities and cost of transport.

I found a new variety of tinned milk to be largely taking the place of the old Swiss condensed milk. The thickened and sweetened condensed milk has a flavour that is disliked by many, also the mixing necessary before use can be made of it—mixture possibly with impure, or, at any rate, unsterilised, liquids, renders it undesirable for many purposes.

The kind of milk I found to be replacing this milk on the market is known as "sterilised milk," and is put up in tins in a similar manner to condensed milk. The "Ideal" is perhaps the most popular, and next to it a brand known as "Dahl's"; the former is a Swiss, and the latter a Norwegian, production. Stone and Sons' Diamond Reef Brand (also Norwegian) is being largely used in Ceylon. This milk requires no mixing, and on merely piercing the tin can be poured out and used as it is. It has no peculiar flavour, and is with difficulty distinguished from fresh cow's milk. The price is about the same as for condensed milk—viz., 5d. to 7d. per tin, retail, according to locality. I obtained samples of "Ideal" and "Diamond Reef" brands, sold respectively at 6 2-5d. and 7 1-5d. per tin in Ceylon, and which I submit for the information of the Department, thinking that if not already known (I have never seen or heard of it here) these samples may be of interest and use, in view of the stimulus that is being given to the manufacture of tinned milk in Queensland.

I also saw and made inquiries concerning various economic plants and trees that would be of value to this country, among them the cocoanut palm that comes into bearing in three years from seed. This is to be found in cultivation by the Maharajah Bobille, of Vizagapatam, but I regret I had neither time nor opportunity to obtain plants or seed.

SYNTHETIC RUBBER.

By HOWARD NEWPORT, F.R.H.S., Instructor in Tropical Agriculture, Cairns.

Since I have been frequently asked, both by letter and by personal applicants, for advice and information whether there was anything to be feared in the direction of synthetic or chemically produced rubber or substitutes for rubber, and as the belief that it would shortly be so produced has been given me as a reason why some will not plant, the following little article, from the latest issue to hand of the "India Rubber World" (No. 4, Vol. 37, of 1st January, page 101), embodying as it does the latest opinion of the greatest

authorities on the subject and those best qualified to know and to judge, may prove of interest both to those who have already embarked on the cultivation of plantation rubber and to prospective producers of this valuable product:—

CONCERNING SYNTHETIC RUBBER.

Just why so many people think that they achieve synthetic rubber, and why so many more—rubber-planters, importers, and manufacturers—are fearful that it will come and in some way upset their business, it is hard to imagine. Reviewing the year's progress in this line, the producers of rubber by artificial means have done everything but produce. Indeed, they seem to lack knowledge as to what synthesis is. It is specifically the building up of complex compounds by special reactions whereby their component radicals are so grouped that the resulting substances are identical in every respect with the natural articles.

The producers of so-called synthetic rubber group themselves into three classes. The first makes something of the oil substitute type that may be used in connection with india rubber, but that has no particular value used alone. They hypnotise themselves into believing that it is practically rubber.

This is not synthesis; it is silliness.

The second class begins with crude rubber, fine Pará preferably, doctoring it with something like oil of wintergreen to thoroughly disguise it, and, by dark and mysterious ways and sleight-of-hand performances, produce for the edification of capital what they call "synthetic rubber."

This is not synthesis; it is sin.

The third class embraces honest, usually aged scientists, who buy most of the ingredients for secret formulas, upset all rules governing chemical reactions (not knowing at just what point the inventor slips the ace out of his sleeve), and produce "synthetic rubber."

This is not synthesis; it is senility.

Not that it is claimed that synthetic rubber will never be attained. It may be. But its first cost for years will probably make it only the plaything of the laboratory. Indeed, so far distant does the production of synthetic rubber seem, when one reviews the attempts towards its production, that it is safe to say that when it does appear the cradles of the land will also be filled synthetically.

Not to hit in any way the honest seeker for this ideal product, but for the guidance of such geniuses as the one who is now in enforced retirement because of his synthetic camphor claims, and who deserves "several years" for robbing certain New Yorkers by his "synthetic rubber" claim, the following working formula is submitted:—

10 lb. Pará rubber.

1 gallon benzol.

1 oz. oil of wintergreen.

Mix thoroughly and evaporate the solvent, then thoroughly mix—

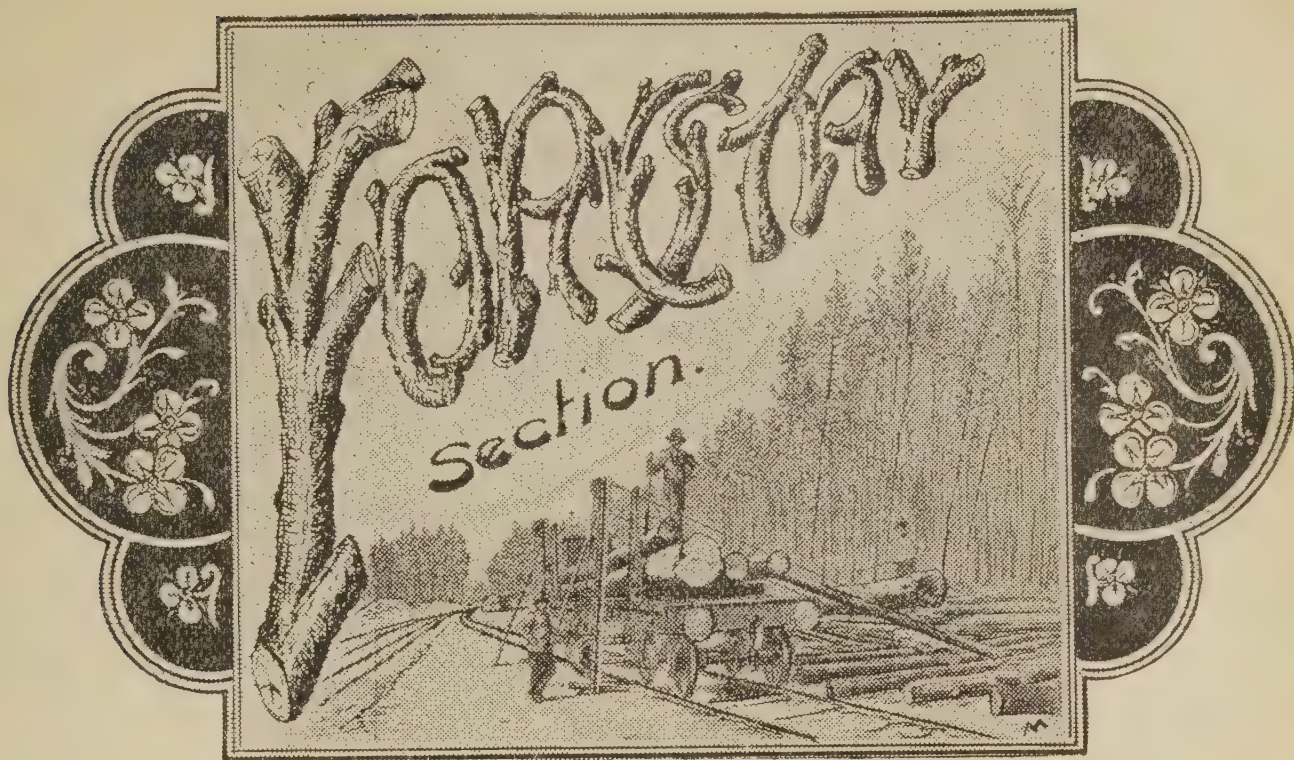
15 parts above mixture.

10 parts ignorance.

25 parts avarice.

50 parts duplicity.

Compound in secret.



Queensland still possesses large areas of forest country containing millions of feet of splendid hard and soft woods, not including the beautiful scrub timbers, which are, of necessity, ruthlessly destroyed as soon as the land is required by farmers for cultivation or for dairying purposes. And this destruction is unavoidable, and would be unavoidable in remote districts, even though railways were built with the idea of conveying the timber to the coast. Timber in the log is cumbersome to move, and the railway freight is necessarily heavy, too heavy to admit of establishing a profitable timber export business outside a certain radius. Nevertheless, it is not disputable that our timber supplies are gradually becoming less, especially so in the case of pine, cedar, and beech. There is only one way of keeping up perpetual supplies of these valuable trees, and that is by reforestation. The problem is, how to do this effectively and systematically. Something has been done in the Cairns district in the way of planting out young cedars in the denuded scrubs, but the work has progressed but slowly, owing to various causes, expense being the chief factor.

In Germany the timber yield is sustained by a vigorous policy of forest management. There, for every tree removed, three young trees have to be planted. In Saxony the cut increased during seventy years from the year 1820 by 50 per cent., and by an additional 5 per cent. in the succeeding four years.

We have just received the full report of the Committee on Forestry, presented by Mr. L. A. Thurston, president of the committee, at the annual meeting of the Hawaiian Sugar-planters' Association, and published in the "Hawaiian Forester" (November, 1907). The following extracts from the report should prove interesting to all who are interested in the conservation of our Queensland forests:—

PINCHOT ON FOREST FAILURE.

THE LUMBER SHORTAGE AND HARDWOOD FAMINE IN THE UNITED STATES.

Gifford Pinchot, chief of the United States Forest Service, in an article published in "The Outlook" for 12th October, 1907, makes the following statement:—

After enumerating the statistics showing the amount of standing timber now in the United States, the present annual consumption, and the present

annual growth, he states: . . . "The result shows a probable duration of our supplies of timber of not more than thirty-three years.

"Estimates of this kind are almost inevitably misleading. For example, it is certain that the rate of consumption of timber will increase enormously in the future, as it has in the past, so long as supplies remain to draw upon. Exact knowledge of many other factors is needed before closely accurate results can be obtained. The figures cited are, however, sufficiently reliable to make it certain that the United States has already crossed the verge of a timber famine so severe that its blighting effects will be felt in every household in the land.

"The rise in the price of lumber which marked the opening of the present century is the beginning of a vastly greater and more rapid rise which is to come.

"We must necessarily begin to suffer from the scarcity of timber long before our supplies are completely exhausted.

"It is well to remember that there is no foreign source from which we can draw cheap and abundant supplies of timber to meet a demand *per capita* so large as to be without parallel in the world, and that the suffering which will result from the progressive failure of our timber was but faintly foreshadowed by the recent temporary scarcity of coal.

WHEN THE FORESTS FAIL.

"What will happen when the forests fail?

"In the first place, the business of lumbering will disappear. It is now the fourth greatest industry in the United States.

"All forms of building industries will suffer with it, and the occupants of houses, offices, and stores must pay the added cost.

"Mining will become vastly more expensive; and, with the rise in the cost of mining, there must follow a corresponding rise in the price of coal, iron, and other minerals.

"The railways, which have, as yet, failed entirely to develop a satisfactory substitute for the wooden tie (and must, in the opinion of their best engineers, continue to fail), will be profoundly affected, and the cost of transportation will suffer a corresponding increase.

"Water power for lighting, manufacturing, and transportation, and the movement of freight and passengers by inland waterways, will be affected still more directly than the steam railways.

"The cultivation of the soil, with or without irrigation, will be hampered by the increased cost of agricultural tools, fencing, and the wood needed for other purposes about a farm. Irrigated agriculture will suffer most of all, for the destruction of the forests means the loss of the waters as surely as night follows day.

"With the rise in the cost of producing food, the cost of food itself will rise. Commerce in general will necessarily be affected by the difficulties of the primary industries upon which it depends.

A SUICIDAL POLICY.

"In a word, when the forests fail, the daily life of the average citizen will inevitably feel the pinch on every side. And the forests have already begun to fail, as the direct result of the suicidal policy of forest destruction which the people of the United States have allowed themselves to pursue. . . .

"We are accustomed, and rightly accustomed, to take pride in the vigorous and healthful growth of the United States, and in its vast promise for the future. Yet we are making no preparation to realise what we so easily and glibly foresee and predict. The vast possibilities of our great future will become realities only if we make ourselves, in a sense, responsible for that future.

"The planned and orderly development and conservation of our natural resources is the first duty of the United States."

MORE EXPERT EVIDENCE.

In a report on the timber supply of the United States, made by R. S. Kellogg, of the Federal Forest Service, in April, 1897, he makes the following statements:—

“The lavish manner in which the United States has consumed the products of its forests and the rapidity with which our timber supply is melting away are wholly unappreciated by those who have never given the matter more than passing consideration. . . .

“Rapidly as the population of the United States has increased, the lumber consumption has increased still more rapidly. In round numbers, the lumber cut in 1880 was 18 billion feet; in 1890, 24 billion feet; and in 1900, 35 billion feet. The increase in population from 1880 to 1900 was 52 per cent., but in lumber cut 94 per cent.

“The original stand of white pine in the North-east is almost entirely cut out. The present stand in the North-eastern States is mainly spruce, second-growth white pine, and hemlock. . . .

“It is well known that the days of white pine are rapidly passing, and . . . it will, in a few years, cease to be a large factor in the timber supply of the United States.

SAWMILLS GO OUT OF BUSINESS.

“At the last annual meeting of the Northern Pine Manufacturers' Association in Minneapolis, Minnesota, the secretary presented the following statement:—

“‘Since 1895, 248 firms, representing an annual output of pine lumber of $4\frac{1}{4}$ billion feet, have retired from business, due to the exhaustion of their timber supply. Plants representing approximately 500 million feet capacity, which sawed in 1906, will not be operated in 1907.’

“The amount of hardwood stumpage is rapidly decreasing. The hardwood cut in 1900 was 8 billion feet; in 1904, 6 billion feet; and the present annual cut of hardwoods is about 5 billion feet.

“As an instance of the timber shortage in the East, it is stated that in New England 6 inches is now a common cutting diameter for white pine, while formerly, and where lumbering is intelligently done, 18 inches is the minimum limit.

“We are rapidly using up our forest capital. Our present annual consumption of wood in all forms is from three to four times as great as the annual increment of our forests. . . . Every indication points to the fact that, under present conditions, the maximum annual yield of forest products for the country as a whole has been reached, and that, in a comparatively short time, there will be a marked decrease in the total output, as there is now in several items. Neither is there any great supply of timber to turn to outside of the United States. With the exception of importations of small quantities of high-class woods, like mahogany, the only promising source is Canada; but most of the timber there will be required at home. Even now Douglas fir (North-west) is bringing higher prices in Canada than in American markets.”

DR. FERNOW ON THE LUMBER SHORTAGE.

In February, 1907, Dr. B. E. Fernow, one of the leading forestry authorities in the United States, made the following statement in an article published in “Forestry and Irrigation” for February, 1907:—

“One hundred and fifty years ago Germany found herself in very much the same condition as regards her forest resources as we are to-day in the United States—all accessible portions more or less culled, or in poor coppice, burnt over, and damaged by cattle, the valuable virgin timber mostly confined to distant and inaccessible locations. Sporadic attempts existed here and there at protection, at regulation of the cut, at conservative lumbering,

and still more sporadic attempts at reforestation. . . . Yet, until the beginning of the nineteenth century, reduction of supplies without adequate reproduction proceeded, and around the year 1800 the wood famine had become acute, giving rise to the same kind of agitation and literature which we have experienced, even to bringing in the catalpa and other such small rapid growers as the saviours of the nation.

PROFITABLE FORESTRY IN EUROPE.

"The severity of the timber shortage in Germany at that time was temporarily relieved through increased production of coal and the building of railroads in hitherto inaccessible forest regions. Then came the vigorous organisation of a settled policy of forest management, based upon the principle of sustained yield, or the cutting of the increment only, without lessening the wood capital. The results of this policy were that in Saxony the cut increased between the years 1820 and 1890—just 50 per cent.—and up to 1904 has increased by another 5 per cent.

"In Prussia, in 1830, the cut was 20 cubic feet per acre, and in 1865 increased to only 24 cubic feet. In 1890 it was 52, and in 1904 it had grown to 65 cubic feet. Forest management increased the average acre production in seventy-five years more than three-fold.

"Every acre of forest in Germany—State, municipal, and private; good, bad, and indifferent; productive and unproductive—now yields an average net profit of 2.40 dollars per acre annually, representing 5 per cent. on a valuation of 50 dollars per acre, and this is constantly improving.

"It must not be overlooked that these results have come largely from non-agricultural lands, the sandy plains, the swamps, the rough mountain slopes, and from forests which were mismanaged like ours.

"Can we expect to attain the same or similar results?

"We ought to do much better, for we have the hundred years of experience of our friends across the water to draw on, and we can avoid many of the mistakes which they have naturally made and paid for."

HALL ON THE HARDWOOD FAMINE.

In the report by William L. Hall, assistant forester of the United States, on "The Waning Hardwood Supply of the United States . . ." dated 24th September, 1907, and which has just arrived in Honolulu, he makes the statement that the cut of hardwood lumber in the United States decreased 15 per cent. between 1899 and 1906.

"This decrease took place during a period when American industries sprang forward at a pace unparalleled; when there was the strongest demand ever known for every class of structural material; when the output of pig iron increased 15 per cent., that of cement 132 per cent., and even that of softwood timber 15 per cent.

"That the decrease is due to diminished supply rather than to lessened demand seems to be proved beyond question. During the same period the wholesale price of various classes of hardwood lumber advanced from 25 to 65 per cent.; every kind of hardwood found in quantity sufficient to make it useful has been put on the market, and hardwood timber is now being cut in every State and every locality where it exists in quantity large enough to be cut with profit. These conditions could not prevail were the decrease in production due to a falling off in demand.

DECREASE OF HARDWOOD SUPPLY.

"Since 1899 the production of oak has decreased 36 per cent.; of yellow poplar, 37 per cent.; of elm, 50 per cent.; of cotton-wood, 36 per cent.; and of ash, 20 per cent."

It is stated that the shortage is being made up by resorting to the inferior hardwoods, and, "although almost all possible new woods have been

brought into use, there has still been a shrinkage in the total output of 15 per cent.

"The supply in Indiana and Ohio, the original centre of hardwood production, is practically exhausted. . . . In all of the States west of the Mississippi Valley the supply is small, and can never become much of a factor. The impressive thing is, that we are bringing hardwoods from far and near, and still the cut is going down.

"The southern part of Michigan, which originally bore magnificent hardwoods, was the first part of the State to be cleared. . . . The same is true of Wisconsin and Minnesota. The almost complete exhaustion of their timber supply and the transformation of their hardwood lands into farms are apparently the only results to be expected. . . . In the Appalachian, as in the other regions, the hardwood lumbermen are working upon the remnants. The supply is getting short, and the end is coming into sight."

ONLY SIXTEEN YEARS' SUPPLY LEFT.

Mr. Hall estimates that from the statistics of present supply of hardwood, and present annual use of the same, there exist in the United States to-day only sixteen years' supply.

He says that since 1898 the price of hard maple, per 1,000 feet, board measure, has increased from 20 dollars to 32.50 dollars per 1,000 feet; of yellow poplar, from 30 dollars to 53.50 per 1,000 feet; of hickory, from 45 dollars to 65 dollars per 1,000 feet; and of quartered white oak, from 60 dollars to 80 dollars per 1,000 feet.

Accompanying this increase in price has been a lowering of the standard.

Prior to 1907, the rules of the trade required even lengths, with a minimum length of 6 feet. In 1907, the Hardwood Lumber Association reduced the minimum to lengths of 4 feet, and allowed odd lengths.

"IT EMPHASISES THE FACT THAT WE ARE DOWN TO THE ROCK BOTTOM, AND REQUIRE EVERY SOUND PIECE OF HARDWOOD LUMBER THAT CAN BE PUT UPON THE MARKET."

Between 1899 and 1906 the number of employees in the hardwood industry in Ohio decreased 40 per cent., and in Indiana 42 per cent.

An enumeration is given of the businesses directly depending upon hardwood—viz., lumber, cooperage, furniture, vehicles, musical instruments, small wooden-ware, agricultural implements, cars, boxes and crates, railroad ties, telephone and telegraph poles, and house finishing.

Mr. Hall concludes:—

"The exhaustion of the hardwood supply means the loss of these industries to the States in which they are located. . . . How intensely the whole country would feel the loss of its hardwood timber . . . can scarcely be realised. . . . A general failure in crops may affect industrial conditions for a few years; a failure in the hardwood supply would be a blight upon our industries through more than a generation.

THE SITUATION IN BRIEF.

"The situation, in brief, is this: We have about a fifteen years' supply of hardwood lumber now ready to cut. . . . The inevitable conclusion is, that there are lean years close ahead in the use of hardwood timber. There is to be a gap in the supply which exists, and the supply which will have to be provided. How large that gap will be depends upon how soon and how effectively we begin to make provision for the future supply. The present indications are that, in spite of the best we can do, there will be a shortage of hardwoods running through at least fifteen years. How acute that shortage may become, and how serious a check it will put upon the industries concerned, cannot now be foretold. That it will strike at the very foundation of some

of the country's most important industries is unquestionable. This much is true beyond doubt: That we are dangerously near a hardwood famine, and have made no provision against it."

After designating possible substitutes for hardwoods, such as metal, concrete, and softwoods, Mr. Hall says:—

THE ONLY PRACTICABLE SOLUTION.

"There to be but one practicable solution, and that is to maintain permanently, under a proper system of forestry, a sufficient area of hardwood land to produce by growth a large proportion of the hardwood timber which the nation requires. . . . The longer the delay in putting the forest under control, the longer continued and more extreme will be the shortage."

The foregoing statements are those of professional salaried experts, with nothing to gain by exaggeration, and are based upon statistics made with all the exhaustive resources of the United States Treasury.

These statistics are brought right up to the year 1907, and bring home to us, as nothing that I have yet seen does, the fact that not only forest protection, but forest reproduction, is of vital import to the sugar industry, as well as every other industry in Hawaii.

We have for years been unthinkingly cutting off our forests for firewood; devastating them with cattle; carelessly allowing their destruction by wild goats, and paying practically no attention to reforestation; while we have imported not only all kinds of both soft and hard wood, both manufactured and unmanufactured, for general domestic use, but have also been importing even our railroad ties, telephone poles, and fence posts.

Within the year we have been brought up against the fact that not only have prices gone ballooning, but that even railroad ties and fence posts are hard to obtain, even at the advanced prices. If prices of lumber in general, and hardwood in particular, are going to be prohibitory in the United States, where the material is produced, they are going to be more so here, where the added freight must be reckoned with.

THE REMEDY IN HAWAII.

What is the remedy?

There is and can be only one remedy. It is the same here that it is in the United States, and the same there that it was in Europe when they faced the same condition a hundred years ago.

The remedy is to stop unnecessary destruction of forests, and immediately begin reforestation, both by protection of semi-forested areas, so that partly destroyed forests will return by natural means; and by replanting.

This should be done both through the medium of private effort and public appropriation.

It lies within the power of every sugar plantation and every cattle ranch in the territory to, within the year, at an expense so small that it bears no comparison to the benefits to be derived, shut out cattle from every portion of the land which ought to be in forest, and, if no more is done, to plant along roadways, around house-lots, in gulches, waste land, and on steep hill sides unsuitable for agriculture, trees enough to, within the next ten years, supply a very large proportion, if not the whole, of the fence posts, railroad ties, telephone poles, and firewood needed for consumption in the territory.

RAPID-GROWING HARDWOODS.

The few years during which there has been a skeleton of a forestry department maintained by the Government in Hawaii has demonstrated that we have available a highly valuable assortment of rapid-growing hardwood trees, such as a number of the varieties of the eucalypti, the ironwoods, the

silver oak, and some of the acacias, besides that most valuable lumber tree, the Japanese pine.

We do not need any statistics or foreign expert advice upon this subject. The forestry experiments which have been carried on by the Government on the ridges back of Honolulu; by the Lihue Plantation and George Wilcox on Kauai; by the Baldwin plantations; the Haleakala Ranch, and by Captain Makee at Ulupalakua, on the island of Maui, and by the Pacific Sugar Company on Hawaii, have already demonstrated what these trees will do.

RESULTS ON HALEAKALA RANCH.

As to what can be accomplished by continuous effort at small expense, I speak only as to my own knowledge in connection with the Haleakala Ranch on Maui, where, within the past seven years, at an expense of less than 500 dollars a year, there have been planted out, and are now growing well, about 60,000 trees, which are already beginning to yield timber for fencing and all necessary ranching purposes.

During the past summer on this ranch there were cut from thirty-three second-growth *rastrada eucalyptus* trees 230 good fence posts.

There is no reason why equally good results cannot be obtained almost anywhere on the islands.

Private work on forests is within the immediate control of individuals and corporations, but public work of this kind requires legislative appropriation.

REFORESTING APPROPRIATIONS NEEDED.

Up to the present time the Hawaiian Legislature has contented itself with appropriations for forest purposes barely sufficient to maintain a skeleton organisation, without sufficient funds to take up the active work of reforesting.

To obtain appropriations for this purpose requires a public enlightenment and support from that portion of the community which recognises the necessity of the situation.

There is no organisation in the territory which compares with the Planters' Association in power to bring to bear upon the Legislature intelligent public opinion and influence.

I submit that not only should the association pass resolutions to be presented to the Legislature in support of appropriations for reforesting, but that, in their own interests, individual members should use their private influence in support of such a policy.

FOUNDATION PRINCIPLES INVOLVED.

I consider that the principles involved in the differentiation between the Hilo forest on the one hand, and the Kau and Kona forests on the other, lie at the foundation of the forestry question in this territory, and that, if the policy as outlined in connection with this particular case can be established as the continuing policy of the territory, it will far more than justify all the expense which the Forestry Department of the Government has heretofore caused, and be added cause for congratulation that the territory has been so fortunate as to secure at the head of its Forestry Department an educated forester, representing the most advanced study and intelligence concerning the subject available in the United States.

Although the Forestry Department in Hawaii has not, as yet, much to show in the way of material returns, it is of immense advantage to the people of this territory to have the principles upon which they should proceed intelligently studied out on the ground, and clearly expressed, so that the layman may understand why it is good economy to lumber one section of the island forests and not to do so in another.

THE IMPORTANT FEATURE.

THE IMPORTANT FEATURE IN THE POLICY EMPHASISED BY THE FOREGOING REPORT IS THE RADICAL DIFFERENCE BETWEEN THE FORESTS WHICH ACT AS A REGULATOR OF THE FLOW OF WATER AND FORESTS FROM WHICH THERE IS NO WATER FLOW.

Whether forests affect climate, especially rainfall, or not, is a disputed point.

My personal belief, based on personal knowledge of a large part of this territory, is that it does have a strong effect thereon in many parts of this territory.

There is, however, no dispute, and can be no dispute, that a thick forest cover not only helps but is absolutely essential to the maintenance of an even flow of water from a given water-producing area.

I go further, and claim that a forest on a water-producing area in this territory, with its heavy rainfalls and short watersheds, is absolutely essential to any economical flow of water at all.

HAWAIIAN WATERSHEDS ARE SHORT.

The Hawaiian streams, which furnish water for irrigation and other economic use, all rise in forest areas with watersheds of from five or six to less than thirty miles in length.

It requires no scientific study or reasoning to demonstrate that water flowing upon an area of land averaging not over 12 to 15 miles in length, and on a grade of from 5 to 50 per cent., will not hold water for more than a few hours after rainfall has ceased, unless there is not only a forest but a thick jungle of ferns, moss, and *débris* to prevent its rushing in a torrent to the sea.

The forest is not enough under such circumstances. There must be a subsidiary of small trees and shrubs; under that a growth of ferns and creeping vines, and in addition to that an undisturbed matting of leaves, sticks, and moss, creating a mass of material so thick as to hamper and almost prevent the flow of water. Once a clearing is made sufficient for the water to wear a course for itself, the heavy torrential rains, with the steep grade, will cut innumerable watercourses to the sea, denuding the land of soil and draining off the water supply.

The almost constant standing water and semi-swampy condition existing in Hawaiian water-producing forests is essential to the very existence of this character of forest, as the existence of this character of forest is necessary to the conservation of the water supply. Neither can exist without the other.

Under these circumstances, any radical interference whatsoever with any portion of the forest immediately sets in motion a train of events which eventually destroys the whole.

In other words, it is my firm conviction, based upon fairly close observation extending over the last thirty-five years, that the forest growth on the water-producing watersheds of Hawaii must be, as far as possible, absolutely closed to interference, either by man or beast, or the result will be, in spite of all effort to the contrary, a doubly reacting disintegration of the forest, and diminution and final destruction of the area as an economic water-producing source.

NON-WATER PRODUCING FORESTS.

In marked contrast to this, as brought out by Mr. Hosmer's report, is the Hawaiian forest, which does not cover a water-producing area.

Here there is no water flow to complicate the question.

There is not only no water to conserve, but the natural growth of the forest, being more open, does not require the careful protection which the forest growing in a semi-swamp does. The undergrowth is hardier, and recovers more easily than it does in the water-soaked section.

With proper care, the mature trees can be removed, not only without radical damage to the remaining growth, but to the advantage of the younger growth, and, by opening up the under vegetation, gives opportunity for seeds to start and saplings to reach the light which otherwise would fail to germinate or die for lack of room.

It becomes simply a question of intelligent lumbering; the making of the forest a revenue-producer through the medium of lumber instead of through the medium of water.

The principle involved in both cases is the same—viz., the causing the soil to produce that which will be the most value to mankind. In the water-producing area, that which can be produced of most value is water. In the non-water producing forest, that which can be produced of most value is timber.

How to intelligently lumber forests is a question which has had expert study of a high class in most European countries, and to which great attention is now being paid in the United States. There is no mystery about it. It simply consists in intelligent application of common sense to local conditions. This has been done in Europe, and is being done in the United States. It has practically never yet been done in Hawaii.

WHAT FOREST RESERVES MEAN.

Popular opinion in Hawaii largely conceives of a forest reserve as an area which is locked up and removed from profitable enterprise.

As a matter of fact, in the case of water-producing forest, it is a devoting of the land to the production of that which is of the most value to the people of the territory—viz., water.

In the case of non-water producing forest, it means not locking up from profitable use but protecting the forest from destructive agencies, so that it can be made profitable, which now it is not, and, with a few exceptions, never has been, and, unless the methods of lumbering and reproduction evolved by study in Europe and the United States are applied here, never will be.

In other words, the most valuable crop which can be produced in a water-bearing forest is water. The most valuable crop which can be produced in a non-water producing forest is timber. Whatever will most effectively accomplish these results in the respective cases is in the public as well as private interest, and should be done.

THE MAHOGANY LUMBER COMPANY.

THIS NATURALLY BRINGS US TO THE CONSIDERATION OF THE EXTENSIVE OPERATIONS NOW BEING UNDERTAKEN BY THE HAWAIIAN MAHOGANY LUMBER COMPANY.

The proposition that Hawaii possesses forests which can produce railroad ties by the million has come as an intense surprise to all but a very few in Hawaii.

The fact that ties can be produced and exported at a profit has come as a surprise to everyone. The only possible explanation thereof is the practical lumber famine which is now upon the United States, and so graphically described in the official reports above quoted from. This shortage has for the

first time made it possible to bring home to the people of Hawaii, in cold dollars and cents, that forest production and lumbering can be made an important industry in this territory.

The fact that nearly 3,000,000 standard railroad ties are to be exported from the territory within the next five years has produced much solicitude and adverse comment among those who have not studied the question. Within the past month I have repeatedly heard the statement made that this contract was a bad thing for the territory, as it would not only denude the forest but exhaust the entire local supply of timber.

WHERE THE TIMBER WILL COME FROM.

So far from this being the case the fact is, that almost this entire contract will be filled with timber cut from the arable lands of the Olaa and Puna Sugar Companies, which, in ordinary process, they are clearing for the cultivation of sugar-cane.

Heretofore, the timber cleared from similar lands has been removed at large expense, and burned on the ground to get rid of it.

Under this contract the timber will be removed at no expense to the plantations, and a handsome stumpage will be paid to them instead.

Just how much more Ohia there is available for lumbering cannot now be definitely stated without much more careful examination than has heretofore been given to the subject, but it is entirely conservative to say that there is ten times as much more available Ohia as that involved in this contract without in any way interfering with water-conserving forests.

Comparatively little of the Ohia forest available for lumbering is suitable for cultivation. The great bulk of it is on land so rocky, or so steep, or at such elevations as to make agriculture impracticable for any products now known to be profitable.

In consequence of this fact, the great bulk of the Ohia forest land will continue to be forest land. Whether they will continue to produce only Ohia timber is a question which the future must determine, after intelligent study by forestry experts has been given to the subject. It may very well be that it will pay to substitute the slow-growing Ohia-tree, as the mature Ohia forest is removed, with the quicker-growing hardwood trees which are so easily propagated here.

NO FEAR OF FOREST DESTRUCTION.

The people of Hawaii need have no fear that the present move to make valuable the heretofore waste forests of Hawaii is a move toward denudation of the forest and the carrying on of the policy of forest destruction which has heretofore prevailed so generally.

The one railroad tie contract above referred to means that there will, within the next five years, be brought into this territory approximately 2,500,000 dollars in gold coin which, but for that contract, would never have come here.

It means that this contract will demonstrate that lumber production can be made one of our leading industries. This is with the proviso, however, that such lumbering is done under intelligent supervision and is followed up by intelligent care of the area lumbered, looking toward the protection of the young trees remaining and the propagation of additional trees.

The outlook is full of hope in this connection, for the operations of the Mahogany Lumber Company, not only in connection with its lumbering of Ohia ties but of the Koa forests, is being consistently carried out, both on the part of the forest owners and of the lumbering company, under the direct supervision and advice of the Superintendent of Forestry, and subject to the rules and regulations of the Board of Forestry.

Chemistry.

ELEMENTARY LESSONS ON THE CHEMISTRY OF THE FARM, DAIRY, AND HOUSEHOLD.

By J. C. BRÜNNICH, Agricultural Chemist.

TWENTY-SECOND LESSON.

THE TESTING OF MILK. SAMPLING. COMPOSITE SAMPLES. SAMPLING OF CREAM.
THE BABCOCK TEST OF MILK, SKIM MILK, AND CREAM. CALCULATION OF THE
YIELD OF COMMERCIAL BUTTER. BUTTER CHART.

In our last lesson we studied the composition of milk, and were told that the composition and the yield may be influenced by various factors. In order to get the best results from a dairy herd, it will be absolutely necessary to get the **yield of butter fat from every cow**, so as to be able to find out which cows give the best profit and are worth breeding from. The testing of milk for butter fat, which some years back could only be done with sufficient accuracy by trained analysts, is now, due to the invention of Dr. S. M. Babcock, a comparatively simple matter. The **Babcock test** is a practical and reliable method to ascertain the amount of *butter fat in milk, cream, skim milk, &c.* No special chemical training is required for the carrying out of the test, and any intelligent person can with care and attention to detail carry out the test and get reliable results in a few minutes. It would be, of course, of great assistance to anyone learning to test if the operations are shown to him by an experienced tester. Due to the introduction of a Government examination in the proficiency of milk and cream testing, experienced testers may be found nearly everywhere in Queensland, and even a large number of State school teachers availed themselves of opportunities to get such certificates.

The object of this lesson is to explain the methods of milk and cream testing by the Babcock tester in a short and practical manner, so that any farmer may be able to test the milk of his dairy herd. Every farmer should make it a practice to **weigh the milk** of each cow. The weighing of milk is much quicker and more accurate than measuring, as reliable spring balances are obtainable everywhere at a very small cost. By pouring the milk into a bucket the weight of which is known, once for all, the weight of the milk of any cow can be ascertained in a few minutes. From the weight the amount in gallons and quarts can be easily calculated, by remembering that 1 gallon or 4 quarts of milk weigh about $10\frac{1}{4}$ lb.

Sampling of Milk.—Before testing, the milk must be **well mixed**, as we know that the composition of the milk varies during the milking, and that the last strippings are particularly rich in butter fat. The mixing of the milk for the sample is best accomplished by pouring the whole of the milk several times from one bucket into another just before the sample is taken.

As it is not always practicable to test every cow twice a day, it is usual to collect **weekly average samples**, for which purpose so-called **composite milk test bottles** are generally used. These bottles are divided into seven equal parts, which are distinctly marked on the outside of the bottle. After the milk has been well mixed, a small quantity is taken out with a small dipper and the bottle filled up to the next mark. This is repeated every day during the week, and the milk finally tested after the seventh day. A separate bottle is used for the evening milkings, which are also tested separately from the morning's milk. If the yield of morning's and evening's milk does not differ very much, as is the case with some cows, the morning's and evening's samples may be mixed for the test, but more accurate results are obtained if

the tests are made independently, and the daily average yield calculated from the weights of morning's and evening's milk and the two average tests, as shown in a practical example later on. In order to **preserve** the composite samples, a small quantity of powdered **bichromate of potash**—about 8 grains for a composite bottle holding 8 oz., or as much as will go on a threepenny bit—is put into the bottle, and after each addition of milk the contents of the bottle are mixed by a gentle rotary motion of the bottle. At the end of the week, when the test is going to be made, the milk in the bottle is well mixed by pouring the whole contents of one bottle into another vessel and back again into the bottle, repeating this several times until the milk sample is well mixed and shows no signs of streakiness. Should any cream have separated out, and should perhaps have hardened on the surface, which may happen if the bottles are kept for a few days after the bottles are filled, it may be necessary to gently warm the bottles to about 110 degrees Fahr. for a few minutes, to let all the fat which had separated out melt, and this fat is then again incorporated with the milk by a vigorous shaking of the bottle before the sample is taken.

Sampling of Cream.—In the mixing and sampling of cream, more particularly if the cream has been standing in cans for some time, a still greater care is absolutely necessary in order to obtain a reliable average sample. Pouring the cream from one can into another is not always practicable, the stirring of the cream in the can with an ordinary stick is more than useless to get the cream mixed, and the only reliable method is by the use of a properly constructed **mixer with plunger**, so arranged that after thorough mixing of the whole contents of the can a true average sample of the mixed cream may be obtained from the whole depth of the can with the sampling tube of this plunger.

The Babcock Test for Milk.—This practical test for the determination of the amount of **butter fat** in milk and its products was invented by *Dr. S. M. Babcock*, the chief chemist of the Wisconsin Agricultural Experiment Station, nearly twenty years ago, and it is based on the action of strong sulphuric acid on the milk solids under liberation of the butter fat, and a subsequent separation of the clear fat from the serum by the aid of centrifugal force. The strong sulphuric acid acts on the solids not fat, by actually *dissolving the casein*, which at first is precipitated, and thereby destroying the agents which keep the fat in emulsion, so that the globules may now collect and run together, which condition is favoured by the great amount of heat generated by the mixing of the strong acid with the milk. The *liberated butter fat* will *rise to the surface*; this separation will again be hastened by the greater difference between the specific gravities of the fat and the milk serum, which difference, by the addition of a large amount of the heavy sulphuric acid, has become very much greater than existing in the original milk. The *separation* may be effected by letting the bottles stand for a few hours, but is very much accelerated and made much more complete by whirling the bottles in the centrifugal testing machines (testers). The centrifugal force produced by the rapid whirling acts most on the heavier constituents, the milk serum, which is forced towards the outside of the machine or towards the bottom of the bottles, whereas the lighter fat is forced towards the centre of the tester or towards the neck of the bottles. The bottles are filled up with hot water to bring the fat right into the neck of the bottles, and this column of fat is finally read off, after some more whirling, on the graduated scale on the neck.

For the carrying out of the test, the following apparatus is required:—

Test bottles, pipette for measuring milk, acid measure, a tester, sulphuric acid, which may be obtained from any of the dealers in dairy apparatus and glassware.



A strict relation must exist between the graduation on the neck of the test bottle and the quantity of milk taken for the test. The milk is measured with the aid of a pipette which holds exactly 17.6 c.c. (cubic centimetres) of milk when filled to the mark on the neck of the pipette. This quantity will, when allowed to run into the milk bottle, deliver 17.5 c.c. of milk, as a small but fairly constant quantity of milk, estimated to be 1.10 c.c., adheres to the side, and the actual quantity of milk delivered equals 18 grammes of milk, as, milk being heavier than water, 1 c.c. weighs on an average 1.03 gramme, and, consequently, $17.5 \text{ c.c.} \times 1.03 = 18.0 \text{ grammes}$. On the neck of the milk bottles we find long division marks from 0 to 10, each again subdivided into 5 parts, each representing $\frac{2}{10}$ of a percent. If we had a milk containing 10 per cent. of fat, the 18 grammes of milk taken would contain 1.8 gramme of butter fat, which, when measured, would occupy a space of $\frac{1.8}{.9} = 2 \text{ c.c.}$; the specific gravity of the fat being less than that of water, only .9, and, therefore, the neck of the milk bottle must hold between the 0 and the 10 per cent. mark exactly 2 cubic centimetres. The accuracy of bottles and pipettes has to be ascertained at the Government Agricultural Laboratory before they are allowed to be used in factories. After being tested, each piece of glassware is marked with an official stamp as a guarantee of its accuracy.

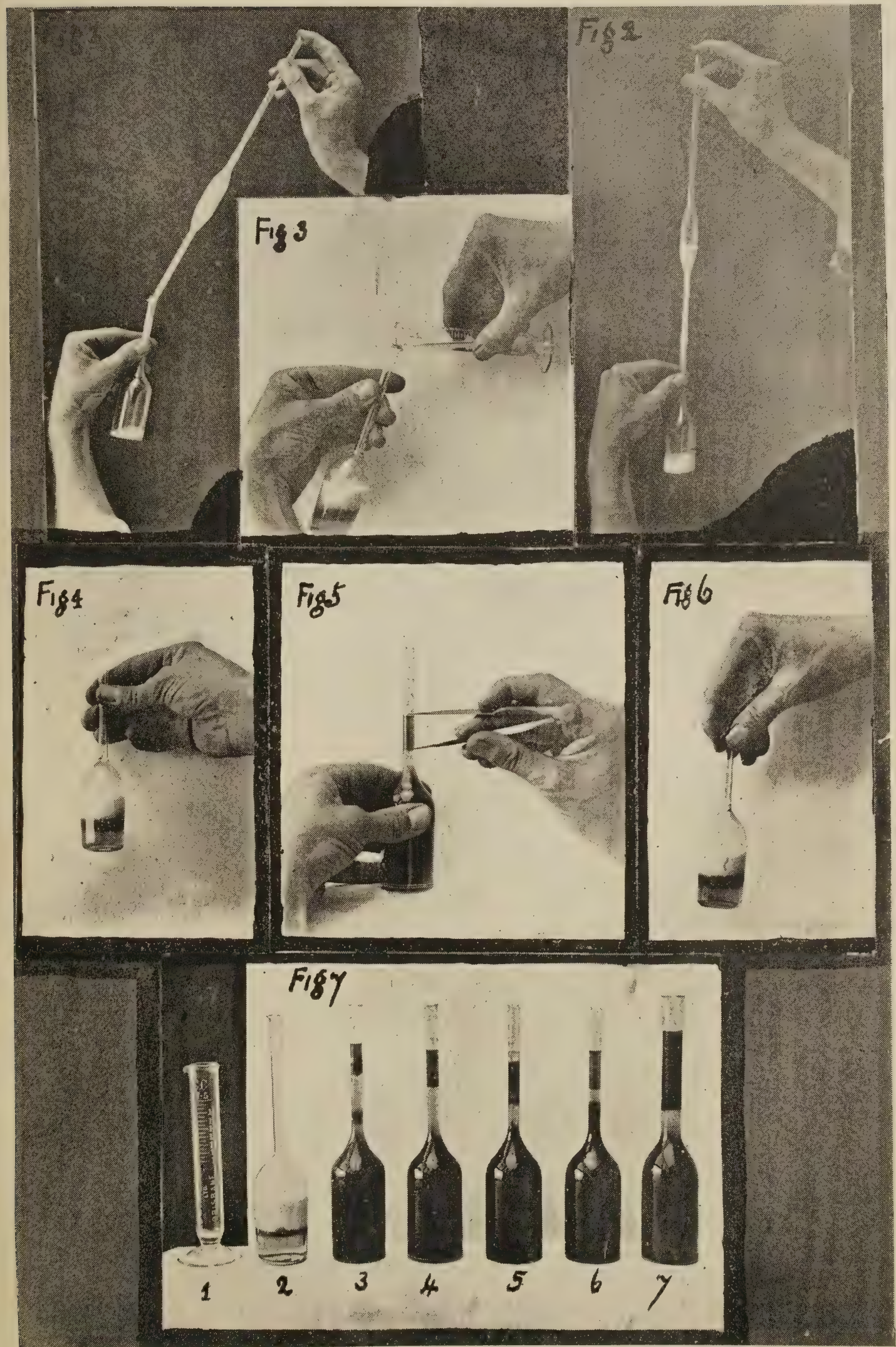
Measuring the Milk with the Pipette.—The exact measuring of the milk with the pipette requires a little practice. The milk immediately after being well mixed is sucked up into the pipette until it rises a little, say about 1 inch, above the mark on the stem of the pipette. The tip of the forefinger is now smartly placed over the opening of the pipette before the milk is allowed to run back below the mark. By slightly lessening the pressure of the finger, the milk is allowed to run out, drop by drop, until it reaches exactly the mark on the stem, the flow then being stopped by again pressing the finger hard down. This running down of the milk to the mark requires some practice, and it will be found that it only can be accomplished if the *tip of the finger is fairly dry*. Some operators work the pipette without the finger, and close the opening of the pipette with the tip of their tongue as soon as the milk has reached the mark, and keep the pipette in the mouth until the milk is transferred to the test bottle. Others, again, who, on account of rough skin on their finger tips, never succeed in running the milk down to the mark, use a finger of the left hand to close the bottom opening of the pipette, and try to get the right quantity by working with the two fingers. If the pipette before

being filled with the milk is not absolutely dry, it must be rinsed out with the milk itself, by filling the pipette with milk and allowing this first filling to run away, and then take up the proper sample. In the same manner when different samples of milk are to be tested one after the other, the pipette is not washed out with water, but only rinsed out once with the sample of milk to be tested; this pipette-full is thrown away, and the second filling taken for the test. The pipette-full of milk is now moved towards the test bottle, taking care that no milk is allowed to run out by keeping the finger well pressed down, and the point of the pipette is placed into the neck of the test bottle, and is *held in an oblique position* (as shown in Fig. 1 of Plate XVII.), and the milk allowed to run slowly down the neck of the bottle, by releasing slightly the pressure of the forefinger. It is quite wrong to push the point of the pipette right down the neck of the bottle (Fig. 2), both bottle and pipette being held perpendicular, as there is always a chance of milk being lost by running over the neck. Not a drop of milk must be lost during this transfer from pipette to bottle, and when all the milk has run out the few drops collecting at the point of the pipette are blown gently into the test bottle.

Adding the Acid.—Commercial sulphuric acid (oil of vitriol), of a specific gravity of from 1·82 to 1·825, should be used for the test, and for each test 17·5 c.c. are required. The acid is measured out with the acid measure, which is filled up to the mark. When a large number of tests have to be made it is more convenient to use a special burette, holding enough acid for twelve or more tests. When adding the acid to the milk in the bottle, the bottle is held again in an inclined position, and the acid is allowed to flow down the neck of the bottle (*see* Figure 3). The bottle is at the same time slowly turned round so that all the milk in the neck of the bottle is washed down by the acid. In order to get good tests, the **temperature of milk and acid** should be about **70 degrees Fahr.**, as too high a temperature will produce the same effect as the use of too much or of *too strong an acid*, which is to give a dark appearance to the fat column, and also produces charred, dark-coloured specks floating about just under and sometimes in the fat. If milk and acid are *too cold*, or the acid *too weak*, the action is not vigorous enough, some of the casein may be left undissolved, producing white specks and a cloudy appearance of the fat and often a peculiar milky layer just under the fat column. The appearance of the finished test will show if the test was properly carried out; the fat column ought to have a bright yellow colour, be perfectly transparent, show no cloudiness between fat and serum, and contain no floating white or black specks in fat or in serum. In illustration 7 of Plate XVII., Fig. No. 3 shows a test with too little acid, No. 4 a good test, and No. 5 is a test with too much acid.

The acid as received from the manufacturers is generally too strong, and instead of attempting to add water to reduce the strength, or by leaving the bottle standing with the stopper out so as to let the acid absorb moisture from the air, it is much more convenient to use a smaller quantity of acid, which quantity is easily ascertained by a few preliminary tests. For this purpose the firm of Messrs. J. and W. Wilson, Wharf street, Brisbane, have constructed, on my recommendation, a special acid measure, graduated from 10 c.c. upwards to 17·6 c.c. (No. 1 of Figure 7, Plate XVII.), so that any desired quantity of acid may be measured off. It will be found that from 12 to 15 c.c. of ordinary strong acid are generally sufficient to give good clear tests.

Mixing the Milk and Acid.—When the acid is added to the milk in the proper manner, both should form distinct layers in the test bottle (No. 2 of Fig. 7) without much discolouration between. The bottles may be left standing in this state until the whole number of tests have been measured out. The bottles must now be shaken with a rotary motion, and it will be found that the clearest tests are obtained if at first a couple of quick semi-circular motions are given to the bottle, so as to mix the acid and milk rather suddenly, and then to continue the mixing by a gentle rotary motion of the milk bottle. The bottles must not be shaken in such a manner that the liquid splashes into the neck of the bottle, and the bottle should be held so that in case of accident the



TESTING OF MILK AND CREAM.

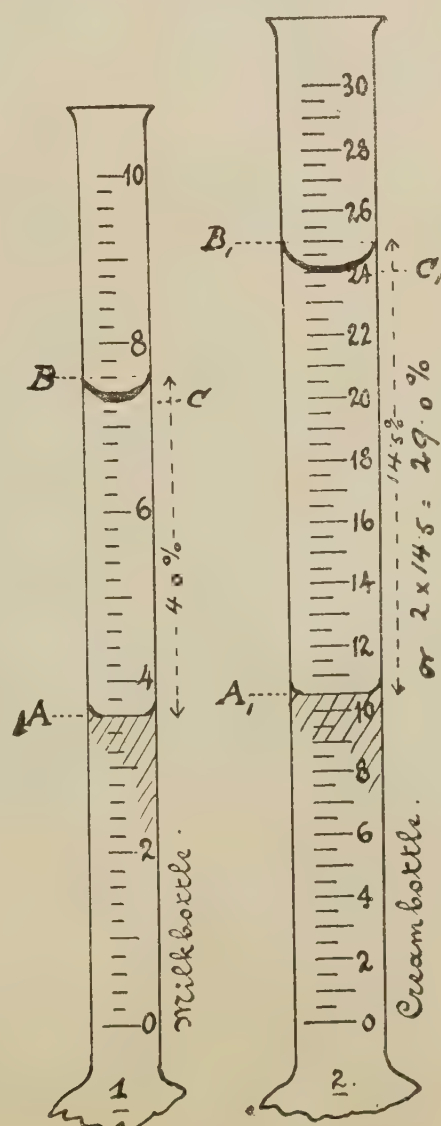
liquid does not touch the hands or the body (Fig. 4), and should never be held like shown in Fig. 6. The solution in the bottle turns at first yellow, then brown, and finally a dark chocolate brown. Too black a colour shows additions of too much or too strong an acid. A peculiar purple colour is sometimes produced if the milk should have been adulterated by the addition of the preservative formalin.

The test bottles may now be left standing for a few minutes before being whirled, and may be left standing even for days without being spoiled, but in this case they will have to be heated up again, before whirling, by placing them for a quarter of an hour into hot water of a temperature of 170 degrees to 180 degrees Fahr., and mixing well again before putting them into the tester.

Whirling the Bottles.—The bottles are now placed into the buckets of the centrifugal machine (tester), and whirled at the rate of 600 to 1,200 revolutions per minute, according to the size of the machine. A tester with a diameter of 18 inches requires about 800 revolutions. The buckets of the small two or four bottle hand testers are generally made much larger, and are so arranged that they can be filled with hot water, to keep the bottles hot. It is important to note that always an even number of bottles should be put into the tester, and they should be placed in pairs diametrically opposite to each other, so that the load is evenly distributed. The **first whirling** is continued for about **4 to 5 minutes**. It will now be noticed that all the fat has risen to the top of the liquid in the bottles.

Adding Hot Water.—Clean hot water, if possible rain water or distilled water, at a temperature of about 160 degrees, is now added to the liquid in the bottle, until the contents reach the lower end of the neck of the bottle, and the bottles are now fuggalled for a **second time for 2 minutes**. The bottles are taken out, and more hot water is now very carefully added until the fat rises into the neck of the bottle, nearly reaching the 10 per cent. mark. The whirling is now repeated a **third time for 1 minute** at full speed.

Reading the Fat Column.—The fat column in the neck is now read off with



the aid of a pair of dividers held in the right hand (Fig. 5), so that the points of the dividers touch the highest and lowest points of the column; and by reading off the actual length by shifting the lower point of the dividers down on the zero mark, the other point will indicate the actual percentage of butter fat in the milk.

It will be noticed by a careful examination of the fat column that the lower line of division between fat and water is an almost straight line (marked A on milk scale), whereas the upper line forms a distinct curve, which must be read off at its highest point B, and not on its lowest point C, or any other point between. When reading the column the bottles must be still hot, and should have a temperature of 130 to 140 degrees. Should the bottles be cold, they must be put into hot water of 140 degrees for a few minutes before the fat column is measured.

As soon as the tests are completed, the bottles, whilst still hot, are emptied out and well washed with hot water containing a little soda.

Recapitulation of the operation of milk testing:—

1. *Mix sample of milk thoroughly and cool, if possible, to about 70 degrees.*
2. *Fill pipette to the mark and run into milk bottle distinctly marked with the number of the test.*
3. *Make a second duplicate test of the same sample.*
4. *Fill acid measure with the necessary amount of sulphuric acid, and add carefully to the milk.*
5. *Mix the acid and milk thoroughly, allow to stand for a few minutes and mix again.*
6. *Whirl in tester at full speed for 4 minutes.*
7. *Add hot water up to neck and whirl for 2 minutes.*
8. *Add hot water until fat nearly reaches the 10 per cent. mark, and whirl again for 1 minute.*
9. *Read off result whilst bottles are still hot (about 140 degrees).*
10. *Read each test twice to make sure of result, and read duplicate test, which should agree to within $\frac{1}{10}$ th per cent.*

One of the great drawbacks in the use of the Babcock test is the necessity of handling the rather dangerous strong sulphuric acid; this difficulty has been overcome by a new test patented by Sichler a few years ago, which is called the "*Sinacid test*," and in which the acid is replaced by an alkaline solution, and the separation of the fat aided by the addition of a very small quantity of isobutyl-alcohol. (No. 6 of Fig. 7 shows a milk test made with the new test.)

Calculation of Yield of Butter.—From the weight of the milk and its test the yield of commercial butter may be easily calculated. First, a small deduction has to be made from the percentage of fat for the unavoidable loss during **separating** (loss of fat in the skim milk) and **churning** (loss of fat in the butter milk), which loss, as found from numerous practical tests, amounts to about $\frac{1}{4}$ per cent. Again, an allowance has to be made for moisture and salt in the finished butter, and it is estimated that 85 lb. of butter fat produce about 100 lb. of commercial butter.

Example 1.—A cow gives on an average 31 lb. of milk daily, with an average test of 3·8 per cent. fat, what is the yield of commercial butter?

Answer.—

$$\begin{array}{rcl} 3\cdot8 \% - \cdot25 \% & = & 3\cdot55 \% \\ 3\cdot55 \times 31 \times \frac{100}{85 \times 100} & = & 1\cdot295 \text{ lb., or} \\ & & 20\frac{3}{4} \text{ oz. commercial butter.} \end{array}$$

GRAPHIC BUTTER CHART

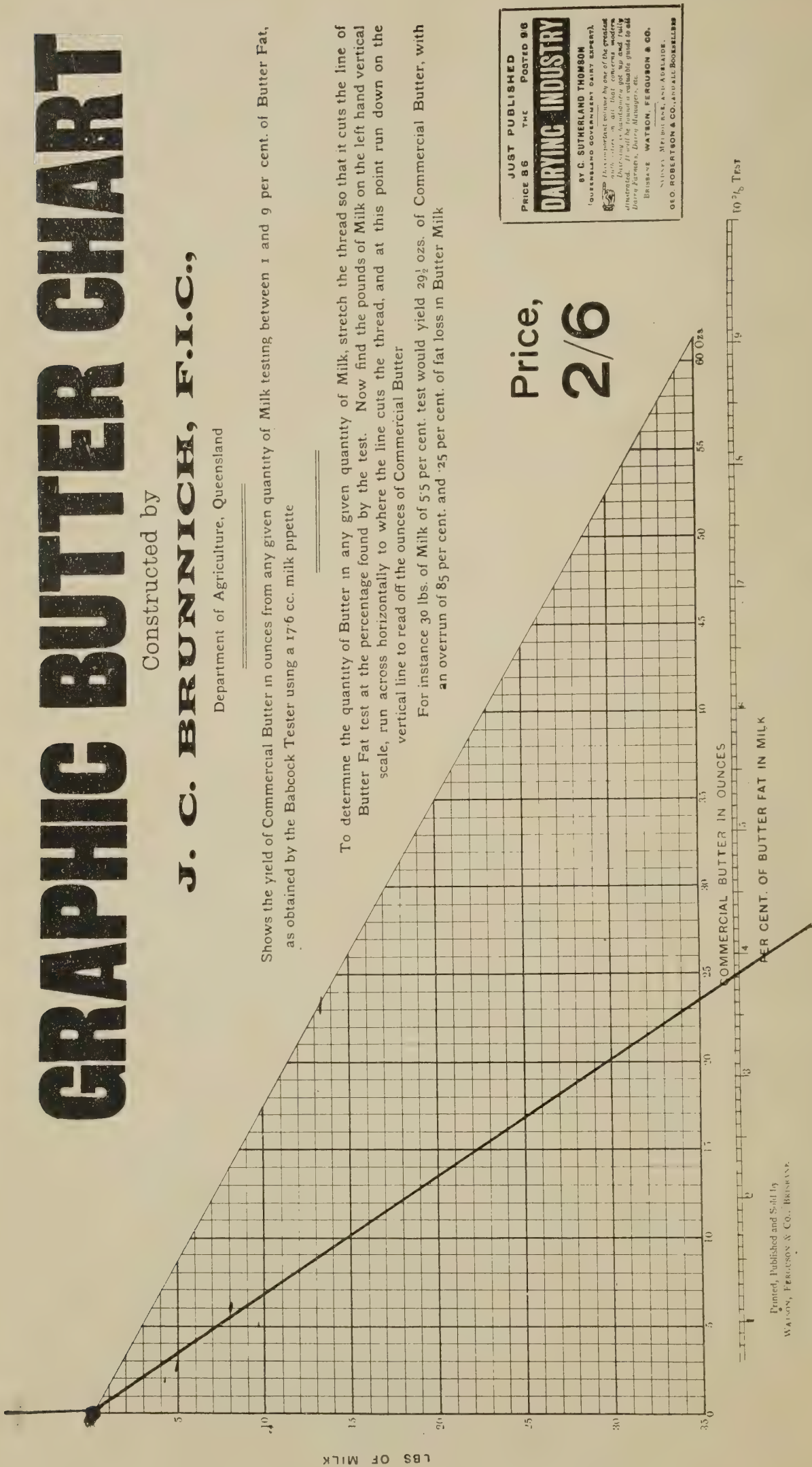
Constructed by
J. C. BRUNNICH, F.I.C.,
Department of Agriculture, Queensland

Shows the yield of Commercial Butter in ounces from any given quantity of Milk testing between 1 and 9 per cent. of Butter Fat, as obtained by the Babcock Tester using a 17.6 cc. milk pipette

To determine the quantity of Butter in any given quantity of Milk, stretch the thread so that it cuts the line of Butter Fat test at the percentage found by the test. Now find the pounds of Milk on the left hand vertical scale, run across horizontally to where the line cuts the thread, and at this point run down on the vertical line to read off the ounces of Commercial Butter

For instance 30 lbs. of Milk of 5.5 per cent. test would yield 29½ ozs. of Commercial Butter, with an overrun of 85 per cent. and .25 per cent. of fat loss in Butter Milk

Price,
2/6



Printed, Published and Sold by
WATSON, FERGUSON & CO., BRISBANE.

This calculation may be avoided by using one of my **graphic butter charts**, in which the amount of commercial butter in ounces may be read off, amount of milk in pounds, and per cent. of fat being given.

The chart is illustrated on Plate XVIII., and is set for a test of 3·8 per cent., the thread (the heavy diagonal line) is stretched so as to cut the scale of per cent. of fat at the point 3·8. The quantity of milk is found on the left-hand perpendicular scale, and the line is followed across horizontally until where it cuts the thread, and the result of commercial butter is read off by following a perpendicular line from this point of section down. We see that 31 lb. of milk will give nearly 21 oz., or, accurately read off, $20\frac{3}{4}$ oz. commercial butter.

According to *O'Callaghan's chart*, which is used in some dairies, the result would be for same amount of milk of the same test 1·31 lb. or just 21 oz.

Example 2.—A cow gives during the week the following amounts of milk in lb. :—

	Mon.	Tues.	Wed.	Thur.	Fri.	Sat.	Sun.	Total.
Morning ...	24	25	22	$25\frac{1}{2}$	24	$26\frac{1}{2}$	27	174
Evening ...	16	17	$15\frac{1}{2}$	17	14	15	$13\frac{1}{2}$	108

and the composite samples of the morning milk gave 4·2 per cent., and of the evening milk 4·55 per cent. of fat. What is the daily average yield of commercial butter?

Answer.—The average daily morning yield is :—

$$\frac{174}{7} = 24\cdot85 \text{ lb. @ } 4\cdot2 \% = 18\frac{1}{2} \text{ oz.}$$

$$\text{Evening yield } \frac{108}{7} = 15\cdot40 \text{ lb. @ } 4\cdot55 \% = 12\frac{1}{2} \text{ oz.}$$

$$\text{Average daily yield} = 31 \text{ oz.}$$

A full, accurate calculation would give for the week :—

From morning's milk	...	...	8·086 lb. commercial butter
From evening's milk	...	...	5·464 lb. „ „
Total	...	...	13·550 lb. „ „ or
$\frac{13\cdot55}{7} = 1\cdot94 \text{ lb.} = 31 \text{ oz. daily.}$			

Testing of Skim Milk.—Special forms of double-necked test bottles are used for the testing of skim milk, in which the tube in which the fat has to be read off is of very narrow diameter, and a special neck or opening is used for the running in of milk and acid. The ordinary style of skim milk bottle has generally ten divisions, each representing $\cdot05$ or $\frac{1}{20}$ per cent. of fat, the whole ten divisions being consequently equal to $\frac{1}{2}$ per cent. of fat.

Other bottles, again, are marked off into $\frac{1}{100}$ per cent., from 0 to $\frac{25}{100}$ per cent. of fat.

In the testing itself the time of whirling should be a few minutes longer, and a larger amount of acid up to 20 c.c. may be used with advantage to get good tests.

Testing of Cream.—For the testing of cream special cream bottles are used, which have a much wider neck, bearing graduation from 0 to 30 per cent., each division again divided into halves, and in some special bottles into $\frac{1}{5}$ of per cent. The pipette used for the ordinary testing should hold 8·8 c.c. of cream, but for accurate work for all the tests the cream should be weighed into the bottles. The specific gravity of cream is less than that of milk and of water, and, therefore, 8·8 c.c. does not represent 9 grammes of cream. Fresh separated cream containing about 25 per cent. of fat has a specific gravity of 1·002, or practically the same as water, and cream of 35 per cent. fat standard has a specific gravity of ·98, 50 per cent. fat a specific gravity of only ·95, so that when testing a 50 per cent. cream only $8\cdot8 \times \cdot95 = 8\cdot36$ grammes of cream are taken for the test, so that the result of fat by measuring found to be 48·5 per cent. should really be—

$$\frac{48\cdot5 \times 9}{8\cdot36} = 52\cdot2 \text{ per cent. of fat.}$$

The specific gravity of cream after standing increases gradually by minute air bubbles escaping, and the practical results of ripe cream will not differ quite so much. O'Callaghan in his chart states that a 48·5 per cent. test by measuring would correspond to a true test of 50·36 per cent., and the actual true result would fall between 50·8 per cent. and 52·2 per cent., according to the age of the cream.

The cream, after having been sampled in the most careful manner, in the case of the cream being lumpy, a slight warming to about 110 degrees will be required, the cream pipette is rinsed out once or twice with the cream to be tested, finally filled up to the mark in the usual manner, and cream run into the test bottle. Now warm water of about 110 to 120 degrees Fahr. is drawn into the pipette, taking care that none of the cream adhering to the sides of the pipette is allowed to run into the water. This may be avoided by holding the pipette, after emptying the cream into the bottle, upside down for a few moments and then to start sucking as the point of the pipette is brought into the hot water. The water is drawn up as near as possible to the mark, but no attempt is to be made to let some of the water out to get it absolutely to the mark. Now part (about $\frac{1}{4}$) of the pipette full of water is run into the cream bottle, then the pipette is closed top and bottom with the forefingers of right and left hand, and well shaken so as to get all the cream washed off the sides, and the whole run into the test bottle on top of the cream. The test bottle contains now 8·8 c.c. of cream and about 8·8 c.c. of water, the contents are well mixed, and the acid added. Generally less acid is required than for milk, and from 11 to 15 c.c. give good tests. Mixing the acid with the cream, whirling, filling up is done exactly the same as with milk. After reading off, the final result has to be multiplied by two to get the actual percentage of fat in the cream. On the figure in test illustrating the fat column in a cream bottle, which has to be read from A_1 to B_1 , as equal 14·5 per cent., the result would be 29·0 per cent. of fat. As the results are multiplied by two, special careful reading is necessary.

The use of dividers is strongly recommended in the reading off, as without it mental calculations, as in the example $25\cdot0 - 10\cdot5 = 14\cdot5$, have to be made, in which subtraction errors are easily made.

Example 3.—What amount of cream and skim milk should be obtained from a given quantity of milk of certain tests?

Answer.—100 lb. of milk testing 4·5 per cent. are separated to give a cream of 30 per cent. test. The quantity of cream is found by dividing the percentage of fat in milk by percentage of fat in cream and multiplying result by the weight—

$$\frac{4\cdot5}{30} = \cdot15 \quad ; \quad \cdot15 \times 100 = 15 \text{ lb. of cream of 30 per cent test,}$$

and consequently $100 - 15 = 85$ lb. of skim milk.

An excellent little book on "Modern Methods of Testing Milk and Milk Products," by L. van Slyke, 1907 ed., can be recommended to anyone requiring fuller information and instruction on this important subject.

QUESTIONS TO TWENTY-SECOND LESSON.

1. What are the principles of the Babcock test?
2. What precautions have to be observed to get true average samples of milk and cream?
3. Describe briefly the operations in doing a milk test.
4. How does different strength of acid affect the tests?
5. What should be the appearance of the fat column if the test is properly carried out?
6. How has the fat column to be read off?
7. Why is 17·6 cc. chosen as the size of the milk pipette?
8. Why are different results obtained when cream is tested by measuring or by weighing out?
9. Describe the process of testing cream by the Babcock test.
10. Why does a certain quantity of fat in cream produce a larger amount of commercial butter?

Science.

THE DIVINING ROD.

That many persons are able, with almost absolute certainty, to not only indicate the presence of water underground, but also to determine the depth at which it will be found, has long been beyond the region of doubt. In our own State of Queensland the services of a water-finder are frequently employed before proceeding to sink a well or start a bore, and success has nearly always attended the diviner's work. On the explanation of the action of the divining rod the "Indian Trade Journal" says:—

We believe no one has ever brought forward a satisfactory explanation of the fact that some few individuals can locate water underground, while the great majority cannot. Some of the best and most practical of our scientific contemporaries have seriously discussed the performances of the "water-finder" and his "divining rod." Among skilled engineers there are at least as many who do believe in him as those who do not. The general explanation of the believers is expressed by the word "magnetism," certainly vaguely, but no more so perhaps than by the use of the word in connection with the cure of disease, for example. But a great step forward has recently been made by a Swiss inventor, who has produced an instrument which indicates the presence of water below ground in a remarkable manner. There is every reason to believe that in some way it is dependent upon electrical currents, for there are within it certain coils of wire and a needle pointer reminding one of a galvanometer. The instrument is placed upon the ground. If there be no water near, the pointer remains stationary. If there be water, the pointer vibrates more or less, varying with the amount and proximity of the spring. The vibration of the pointer is such as to indicate also in which direction the water lies, so that by moving the instrument from place to place the exact position for well-sinking can be readily ascertained. The instrument is said to be as efficient in locating oil as water, and that the only case in which it fails to work satisfactorily is in proximity to veins of ironstone. The instrument is light and portable, and should prove invaluable to prospectors and colonists. Messrs. Mansfield and Co., of Creewood Buildings, Brunswick street, Liverpool, have secured the sole agency for its sale in Great Britain and British colonies.

POISONING CROWS.

A correspondent at Hapsburg, Isis, writes as follows in defence of the crows:—

"In your February Journal you give a recipe for killing crows. In the name of all that is sensible, keep every bird we can alive in this country. Those same crows are a God-send up here. Last year I had no end of grubs, and some 200 or 300 crows used to follow my ploughs, eating off their heads, as the bodies of the grubs are too squashy. On the Johnstone we had very few birds of any description, and the grubs were worse than I have ever seen them. No. Advise every cane farmer to cultivate the breeding of crows and all insect-eating birds."

[Of course there are two sides to every question, and what is looked upon as a pest by one class of producer is considered a God-send by another. Rabbits in Queensland are a serious pest, but in Victoria and New South Wales they are turned to commercial profit, and afford profitable employment to thousands of rabbiters. We should think that the ibis would do for the cane farmer as much as the crows, without inflicting injury on other primary industries. Our correspondent's demand for the preservation of all insect-eating birds is in accordance with common sense.—Ed. "Q.A.J."]

Statistics.

COMMONWEALTH METEOROLOGY.

RAINFALL OF QUEENSLAND.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

STATIONS.	1907.											1908.	
	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.
<i>North.</i>													
Bowen	3.74	1.97	0.39	3.43	2.87	Nil	1.28	0.51	0.06	3.71	6.39	10.14	5.63
Cairns	11.49	3.26	3.35	8.65	4.45	0.12	0.39	1.35	0.68	5.35	28.33	27.02	8.03
Geraldton	25.26	4.58	6.08	21.91	8.54	2.39	4.66	1.36	1.42	6.45	33.82	44.39	13.27
Herberton	11.77	2.05	0.90	1.57	2.71	Nil	0.11	0.12	0.17	3.41	9.57	9.29	5.02
Hughenden	3.83	1.17	0.16	1.34	0.95	1.16	Nil	Nil	1.66	0.66	7.75	0.98	5.18
Kamerunga State Nurs.	14.82	4.87	2.80	9.33	5.29	0.13	1.15	1.19	0.53	2.76	29.82	...	7.47
Longreach	0.49	1.88	0.85	0.93	0.40	0.49	0.04	Nil	1.08	2.33	9.12	Nil	4.07
Lucinda	23.82	4.53	3.92	19.29	6.34	0.29	1.05	1.19	0.25	0.43	23.38	25.93	13.04
Mackay	6.42	8.01	1.58	6.09	5.04	0.27	0.25	0.12	0.12	5.76	9.70	9.28	3.83
Rockhampton	4.42	3.05	0.44	0.94	4.16	0.84	0.47	Nil	0.47	3.72	4.42	3.84	9.64
Townsville	7.75	7.37	1.03	3.11	2.38	Nil	0.07	0.14	0.03	2.82	24.26	12.21	6.69
<i>South.</i>													
Barcaldine	0.43	1.51	0.82	0.34	2.03	0.87	0.06	Nil	1.21	1.54	11.74	Nil	5.73
Beenleigh	3.88	4.17	0.58	4.70	4.92	0.71	0.58	Nil	1.73	2.81	4.48	2.41	9.41
Biggenden State Farm	3.55	10.91	0.34	4.02	5.24	1.51	0.96	0.24	1.99	2.50	5.55	...	9.82
Blackall	Nil	2.78	1.69	0.20	0.36	1.36	0.06	Nil	0.88	0.80	7.47	0.63	7.02
Brisbane	5.23	5.32	0.45	4.75	2.91	0.39	0.79	0.10	1.37	4.25	3.21	2.80	8.43
Bundaberg	3.90	12.81	0.38	3.08	4.49	0.87	0.43	Nil	1.70	2.90	2.99	4.77	2.82
Caboolture	8.03	9.04	0.78	3.10	4.98	0.73	0.32	0.13	2.09	4.15	3.18	9.36	18.06
Charleville	Nil	2.75	2.29	0.26	0.90	1.04	0.76	0.02	1.69	3.88	4.09	0.32	1.67
Dalby	1.34	3.72	0.20	2.26	2.35	0.87	0.71	0.15	0.69	5.18	1.44	0.17	4.88
Emerald	3.67	7.66	Nil	Nil	2.53	1.75	0.10	Nil	0.98	1.84	6.70	0.49	10.85
Esk	6.79	3.60	0.22	5.42	2.66	0.54	0.81	0.57	0.50	3.76	3.72	2.61	10.06
Gatton Agric. College	6.44	2.71	Nil	2.80	1.85	0.54	0.56	0.15	0.71	3.01	4.55	...	3.38
Gayndah	1.91	6.89	Nil	2.65	3.00	1.21	0.53	0.40	0.34	4.65	6.84	1.22	8.33
Gindie State Farm ...	0.71	10.10	Nil	Nil	2.29	1.58	0.10	0.16	0.61	1.57	4.42	0.20	7.17
Goondiwindi	1.77	6.51	0.33	1.30	1.09	1.62	0.95	0.12	1.13	2.91	3.71	1.22	4.23
Gympie	6.96	8.93	1.12	3.84	3.77	0.80	0.17	0.47	1.20	3.05	5.49	6.26	11.77
Ipswich	5.38	1.95	0.12	3.43	2.22	0.30	0.43	0.05	0.78	4.45	3.40	1.32	6.63
Laidley	4.50	3.47	Nil	2.99	1.56	0.45	0.58	0.15	0.87	1.97	2.72	1.61	5.80
Maryborough	7.84	10.28	1.25	3.21	6.05	0.64	0.93	0.25	2.74	3.49	5.81	5.62	8.07
Nambour	12.05	13.30	1.36	4.54	6.96	1.08	1.13	0.60	1.38	2.98	4.76	9.29	15.16
Nerang	6.04	7.83	1.48	7.54	5.08	1.26	1.35	0.05	0.86	3.88	4.51	3.83	9.14
Roma	2.92	1.87	0.42	0.27	2.47	1.03	0.42	0.04	1.04	3.70	2.51	0.04	6.38
Stanthorpe	3.30	5.98	1.68	1.79	2.44	1.06	1.65	0.13	1.30	5.03	3.46	0.60	4.09
Tambo	1.41	3.58	3.69	0.11	0.89	1.42	0.09	Nil	0.68	2.03	7.20	0.36	4.87
Taroom	1.10	1.86	Nil	1.01	3.76	0.70	0.04	0.10	0.67	6.82	3.79	0.20	7.51
Tewantin	15.83	11.45	1.87	7.16	7.61	1.48	0.95	0.55	1.05	3.12	7.36	10.42	12.47
Texas	4.55	6.16	0.65	0.93	1.62	1.31	0.87	0.07	1.83	2.78	2.15	1.57	6.89
Toowoomba	4.00	4.81	0.01	4.61	3.34	0.91	0.65	0.17	1.58	5.12	2.81	1.16	7.66
Warwick	2.52	5.71	0.51	1.58	1.27	1.16	1.37	0.01	1.37	3.25	3.13	0.76	4.52
Westbrook State Farm	2.91	5.13	0.02	2.53	2.53	1.04	1.78	Nil	1.08	4.76	3.23	...	...

NOTE.—The rainfall data in this table are compiled from telegraphic reports, and must be considered approximate only.

GEORGE G. BOND,
Divisional Officer.

[The figures for Kamerunga, Biggenden, Gatton College, and Westbrook are now supplied direct to the Department by the officers in charge of those institutions.—Ed. "Q.A.J."]

General Notes.

MANUFACTURE OF PINEAPPLE JUICE.

During the manufacture of canned pineapples a very large amount of refuse in the form of peelings and trimmings collects in the factory, which raw material is at present allowed to go to waste, and its disposal is quite a nuisance to the factories. Early last year the Agricultural Chemist prepared a few bottles of pineapple juice, which were opened after having been kept for twelve months, and the juice was found to be of excellent quality, having kept its pure flavour of the fresh fruit. The complete success of the experiment encouraged the Department of Agriculture and Stock to experiment on a larger scale, so as to prepare about a gross of pint bottles of pure pineapple juice from waste materials only, for the Franco-British Exhibition. Messrs. Hargreaves and Sons, of Tingalpa, were good enough to allow us the use of their manufacturing plant, and also supplied the raw material, the peelings of barely a couple of hours' work. The peelings have to be worked up at once, as even after a few hours' keeping fermentation would set in, which must be avoided to get a juice absolutely pure, possessing a fine flavour, and which is free from alcohol and preservatives. The demand for such pure fruit juices in Europe and elsewhere has enormously increased of late years, and our pineapple juice should be a successful rival of such drinks prepared from other fruits. The juice may be used in its pure state, or may be diluted with water, according to taste, or, again, could be aerated, and make a sparkling, palatable, and nutritious drink.

The peels are passed through some sort of pug mill, and then are pressed in a strong press. The juice is run through a sieve or cloth to remove any floating matter, and is then heated in a suitable boiler to about 170 degrees Fahr., and kept at that temperature for about half an hour. This heating pasteurises the juice by destroying all micro-organisms, and at the same time coagulates some of the impurities, which easily settle down on standing.

The hot juice is drawn off into a clean cask, which is covered up and allowed to stand for about twelve hours to settle, and the clear juice syphoned off. The drawn-off clear juice is again heated to 170 degrees Fahr., and bottled whilst hot and corked at once. The filled bottles have again to be heated after having been kept for twenty-four hours, which is best accomplished and does away with further handling by placing them into a wooden steam chest, where they can be gradually heated to 165 degrees, and kept at that temperature for about half an hour. The right temperature is ascertained by placing a thermometer right into the centre of a bottle of the same size filled with water, and placed in the centre near the top of the chest, so that the thermometer projects through the top of the steam box. This heating is repeated after another twenty-four hours' standing, which completes the treatment.

This process of repeated heating to 165 degrees Fahr. with twenty-four hours' interval, absolutely sterilises the juice, so that it will keep indefinitely, preserving at the same time the fine fruity flavour, as the juice was never actually boiled. A small amount of sugar may be added to the juice if the pines are not very sweet, and in the manufacture of such juice on a large scale, the juice drawn off from the settling cask or tank may be filtered by some suitable apparatus in order to get it absolutely clear.

VICTORIA AND IMPORTED PINEAPPLES.

Advice has been received from Victoria by the Department of Agriculture and Stock, that in future a charge of 1d. per case will be made by the Victorian Department of Agriculture for the inspection of imported pineapples.

LOCUSTS AND ZINC SHEETS—AN INGENUOUS DEVICE.

Locusts having of recent years increased alarmingly in the Argentine Republic, and done enormous damage to the wheat, maize, and linseed crops, the Government determined last year to take steps for the destruction of the pest. As a result of the expert advice which it obtained, it was decided to make a novel experiment. The Argentine Government placed an order with the United Silesian Zinc Rolling Mills for 5,000 tons of zinc sheets. The works securing the order were new to this trade, but they managed to make a very good record in the matter of deliveries, the first lot of 450 casks (22½ tons) leaving Hamburg for Buenos Ayres on 27th May, and regular shipments being made at a few days' interval to there and to Rosario. It seems curious to speak of zinc sheets being used for the extermination of locusts, but really there is nothing very strange about it. The sheets are up-ended, embedded in the ground, and placed in a line running across country, a trench being dug on either side of the sheet. When a locust swarm alights it eats its way along until it reaches the barrier of zinc sheets. Owing to the greasy surface of the metal, the insects are unable to scale the sheets, and the result is a dense accumulation in the trench. Then, by the aid of a few tins of kerosene and the application of a match, a holocaust is produced, and the sheets remain unimpaired, ready for the next onslaught. Galvanised sheets have also been used for the same purpose, but, although they are much less expensive than are zinc sheets, they do not answer the purpose so well, besides which they suffer deterioration from exposure, which is not the case with zinc sheets. The idea of using this material is quite a novelty. In Northern Africa, where swarms of locusts are a perennial scourge, American cloth has been used in the same way with some success, the shiny surface affording no foothold to the adventurous *Orthopterae*, whose doom is hastened by the judicious use of the kerosene can.

Times of Sunrise and Sunset at Brisbane, 1908.

DATE.	JANUARY.		FEBRUARY.		MARCH.		APRIL.		PHASES OF THE MOON.
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	
1	4.56	6.45	5.20	6.42	5.41	6.20	5.57	5.46	4 Jan. ☉ New Moon 7 43 a.m.
2	4.57	6.46	5.21	6.42	5.41	6.19	5.58	5.45	10 „ ☾ First Quarter 11 53 p.m.
3	4.58	6.46	5.22	6.41	5.42	6.18	5.58	5.44	18 „ ○ Full Moon 11 37 „
4	4.58	6.46	5.23	6.41	5.43	6.17	5.59	5.43	27 „ ☽ Last Quarter 1 1 a.m.
5	4.59	6.46	5.23	6.40	5.43	6.16	6.0	5.41	
6	5.0	6.47	5.24	6.40	5.44	6.15	6.0	5.40	
7	5.0	6.47	5.25	6.39	5.44	6.14	6.1	5.39	
8	5.1	6.47	5.26	6.38	5.45	6.13	6.1	5.38	2 Feb. ☉ New Moon 6 36 p.m.
9	5.2	6.47	5.26	6.38	5.45	6.11	6.2	5.37	9 „ ☾ First Quarter 2 27 „
10	5.2	6.47	5.27	6.37	5.46	6.10	6.2	5.36	17 „ ○ Full Moon 7 5 „
11	5.3	6.47	5.28	6.36	5.46	6.9	6.3	5.35	25 „ ☽ Last Quarter 1 24 „
12	5.4	6.47	5.29	6.36	5.47	6.8	6.3	5.34	
13	5.5	6.47	5.29	6.35	5.47	6.7	6.4	5.33	
14	5.6	6.47	5.30	6.34	5.48	6.6	6.4	5.32	
15	5.6	6.47	5.31	6.33	5.49	6.5	6.5	5.31	
16	5.7	6.47	5.31	6.33	5.49	6.4	6.5	5.30	3 Mar. ☉ New Moon 4 57 a.m.
17	5.8	6.47	5.32	6.32	5.50	6.3	6.6	5.29	10 „ ☾ First Quarter 7 42 „
18	5.9	6.47	5.33	6.31	5.50	6.2	6.6	5.28	18 „ ○ Full Moon 0 28 p.m.
19	5.10	6.47	5.34	6.30	5.51	6.1	6.7	5.27	25 „ ☽ Last Quarter 10 32 „
20	5.10	6.47	5.34	6.29	5.52	5.59	6.7	5.26	
21	5.11	6.46	5.35	6.28	5.52	5.58	6.8	5.25	
22	5.12	6.46	5.36	6.28	5.53	5.57	6.8	5.24	
23	5.13	6.46	5.36	6.27	5.53	5.56	6.9	5.23	1 Apr. ☉ New Moon 3 2 p.m.
24	5.14	6.46	5.37	6.26	5.54	5.55	6.9	5.22	9 „ ☾ First Quarter 2 32 a.m.
25	5.14	6.45	5.38	6.25	5.54	5.54	6.10	5.21	17 „ ○ Full Moon 2 55 „
26	5.15	6.45	5.38	6.24	5.54	5.53	6.11	5.20	24 „ ☽ Last Quarter 5 7 „
27	5.16	6.45	5.39	6.23	5.55	5.52	6.11	5.20	
28	5.17	6.44	5.39	6.22	5.55	5.50	6.12	5.19	
29	5.18	6.44	5.40	6.21	5.56	5.49	6.12	5.18	
30	5.19	6.43	...	...	5.56	5.48	6.13	5.17	
31	5.19	6.43	...	...	5.57	5.47	...	...	

Answers to Correspondents.

DRYING OFF A COW.

DAIRYMAN, Wycarbah.—

Cows are dried off by checking the activity of the mammary glands, which follows when the milk is not thoroughly taken away from the udder. Therefore, do not milk clean—that is to say, leave some milk in the vessel after each milking, and when the flow has lessened milk once a day until the cow is dry. A cow should be dried off from two to three months before calving.

WHEAT IN THE STACK.

FARMER, Westbrook.—

We are not aware that Queensland farmers keep wheat for any length of time in the stack before threshing. Many could not afford to do so, even to wait for a rise in price, and those who could afford to wait think it more sensible to realise promptly and put the money to good use on the farm. All we can tell you is that there is a wheat stack in England nearly thirty years old, the grain being still in good condition. For the benefit of yourself and other readers we reproduce this stack from the "Mark Lane Express" (18th November, 1907):—



A REMARKABLE WHEAT STACK.

The wheat stack shown above has been standing in its present position for close upon thirty years. It belongs to Mr. Philip Selby, and is to be seen in his stackyard at Aisby, a few miles from Grantham. The stack can undoubtedly claim the distinction of being the oldest of its kind in the world. It is said that the reason it has never been threshed is because the owner once made a vow that he would not sell the grain under a certain price, which it never attained. It is black with age, but the grain is in good condition. It is said that there is not a rat in the stack; the holes seen in the picture have been made by birds.

The Markets.

PRICES FOR FRUIT—ROMA-STREET MARKETS.

Article.						FEBRUARY.
						Prices.
Apples, Imported, per quarter-case	...	...	...	...	...	2s. to 2s. 6d.
Apples, New England, per packer	...	...	...	...	...	...
Apples, Tasmanian, Cooking	...	...	...	...	...	6s. to 8s. 6d.
Apricots, Local, per packer	...	...	...	...	...	...
Bananas, Fiji, per case	...	...	...	...	...	...
Bananas, Fiji, per bunch	...	...	...	...	...	...
Bananas, Queensland, per case	...	...	...	...	...	...
Bananas, Queensland, per bunch	...	...	...	...	...	4d. to 2s.
Cocoanuts, per bag	...	...	...	...	...	...
Custard Apples, per quarter-case	...	...	...	...	...	4s. to 6s.
Grapes, per lb.	...	...	...	...	...	2d. to 5d.
Lemons (Lisbon), per case	...	...	...	...	...	3s. to 7s. 6d.
Lemon, rough, per case	...	...	...	...	...	1s. 3d. to 2s. 3d.
Mangoes, Queensland, per packer	...	...	...	...	...	...
Nectarines, per box	...	...	...	...	...	...
Oranges, Imported, per case	...	...	...	...	...	20s. to 22s. 6d.
Passion Fruit (Local), choice, per half-case	...	...	...	...	...	...
Passion Fruit, medium, per half-case	...	...	...	...	...	...
Passion Fruit, small, per half-case	...	...	...	...	...	...
Papaw Apples, per quarter-case	...	...	...	...	...	2s. to 2s. 6d.
Peaches, per quarter-case	...	...	...	...	...	5s. to 6s.
Peanuts, per lb.	...	...	...	...	...	...
Pears, per quarter-case	...	...	...	...	...	7s. to 8s.
Persimmons, per case	...	...	...	...	...	...
Pineapples (Queensland), Queen, per dozen	...	...	...	...	...	1s. 3d. to 3s. 6d.
Pineapples (Queensland), rough, per dozen	...	...	...	...	...	1s. to 1s. 6d.
Pineapples, smooth, per dozen	...	...	...	...	...	1s. 3d. to 3s.
Plums, per quarter-case	...	...	...	...	...	5s. to 6s.
Quinces, per gin case	...	...	...	...	...	6s.
Rockmelons, Local, per gin case	...	...	...	...	...	...
Tomatoes, Local, per box	...	...	...	...	...	1s. 6d. to 3s.
Watermelons, Local (large), per dozen	...	...	...	...	...	...
Watermelons (medium), per dozen	...	...	...	...	...	...
Watermelons (small), per dozen	...	...	...	...	...	...

SOUTHERN FRUIT MARKET.

Bananas, Fiji, per case	...	...	...	...	...	13s. to 13s. 6d.
„ „ per bunch	...	...	...	...	...	4s. to 7s. 6d.
„ Queensland, per case	...	...	...	...	...	12s. 6d. to 13s.
„ „ per bunch	...	...	...	...	...	2s. 6d. to 5s. 6d.
Cocoanuts, per bag	...	...	...	...	...	10s. 6d. to 11s.
„ per dozen	...	...	...	...	...	1s. 6d. to 2s. 6d.
Lemons (choice coloured), per case	...	...	...	...	...	12s.
„ (good), per gin case	...	...	...	...	...	7s. to 8s.
„ (rough), per gin case	...	...	...	...	...	4s. to 5s.
„ (Italian), per case	...	...	...	...	...	13s. to 17s.
Mangoes, Queensland, per case	...	...	...	...	...	...
Oranges, American Navel, per case	...	...	...	...	...	16s. to 18s.
Oranges, common, choice, per case	...	...	...	...	...	10s.
Oranges, medium, per case	...	...	...	...	...	6s.
Passion Fruit, per quarter-case	...	...	...	...	...	5s. 6d.
Peanuts, per quarter-case	...	...	...	...	...	...
Pineapples, Queensland (Queens), choice, per case	...	...	...	...	...	4s. to 5s.
Pineapples, Queensland (Queens), medium, per case	...	...	...	...	...	3s. to 3s. 6d.
Rockmelons, per double case	...	...	...	...	...	...
Tomatoes, per quarter-case	...	...	...	...	...	3s. to 3s. 6d.
Watermelons, Queensland, per dozen	...	...	...	...	...	...

The wharf labourers' strike, has, it is stated, disorganised the interstate fruit trade.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR MARCH.

Article.							MARCH.	
							Prices.	
Bacon, Pineapple ...	...	...	...	...	...	lb.	9½d.	
Bran ...	...	...	...	...	...	ton	£6 5s. to £6 10s.	
Butter, Factory ...	...	...	...	...	...	lb.	10½d.	
Chaff, Mixed ...	...	...	...	...	...	ton	£3 to £5	
Chaff, Oaten ...	...	...	...	...	...	"	£6 to £7	
Chaff, Lucerne ...	...	...	...	...	...	"	£5 to £5 10s.	
Chaff, Wheaten ...	...	...	...	...	...	"	£3 to £3 5s.	
Cheese ...	...	...	...	...	...	lb.	6½d. to 10½d.	
Flour ...	...	...	...	...	...	ton	£10 15s.	
Hay, Oaten ...	...	...	...	...	...	"	£7 5s. to £7 15s.	
Hay, Lucerne ...	...	...	...	...	...	"	£3 to £4 5s.	
Honey ...	...	...	...	...	...	lb.	2¾d.	
Maize ...	...	...	...	...	...	bush.	4s. 3d. to 4s. 6d.	
Oats ...	...	...	...	...	...	"	3s. 8d. to 3s. 10d.	
Pollard ...	...	...	...	...	...	ton	£8 5s. to £8 10s.	
Potatoes ...	...	...	...	...	...	"	£5 to £6 10s.	
Potatoes, Sweet ...	...	...	...	...	...	"	...	
Pumpkins ...	...	...	...	...	...	"	...	
Wheat, Milling ...	...	...	...	...	...	bush.	4s. 10d. to 5s.	
Wheat, Chick ...	...	...	...	...	...	"	4s. 9d. to 4s. 10d.	
Onions ...	...	...	...	...	...	ton	£6 to £6 15s.	
Hams ...	...	...	...	...	...	lb.	11d. to 1s.	
Eggs ...	...	...	...	...	...	doz.	10d. to 1s. 4d.	
Fowls ...	...	...	...	...	...	pair	2s. 2d. to 3s. 3d.	
Geese ...	...	...	...	...	...	"	5s. 4d. to 6s.	
Ducks, English ...	...	...	...	...	...	"	3s. to 3s. 6d.	
Ducks, Muscovy ...	...	...	...	...	...	"	3s. 7d. to 4s. 9d.	
Turkeys (Hens) ...	...	...	...	...	...	"	6s. to 7s. 6d.	
Turkeys (Gobblers) ...	...	...	...	...	...	"	8s. to 12s. 6d.	

ENOGGERA SALEYARDS.

								FEBRUARY.
								Prices.
Bullocks	...	...	...	...	...	...	...	£8 12s. 6d. to £10 7s. 6d.
Cows	...	...	...	...	...	...	...	£6 12s. 6d. to £7 10s.
Merino Wethers (Shorn)	...	...	...	...	...	...	...	21s. 6d.
C.B.	"	"	...	...	...	...	...	20s. 6d.
Merino Ewes	"	"	...	...	...	...	...	15s.
C.B.	"	"	...	...	...	...	...	20s. 9d.
Lambs	...	...	...	...	...	...	...	15s. 9d.
Pigs (Baconers)	...	...	...	...	...	...	...	38s.
" (Porkers)	...	...	...	...	...	..	...	27s. 6d.

Orchard Notes for May.

By ALBERT H. BENSON, M.R.A.C.

THE SOUTHERN COAST DISTRICTS.

The advice that I have given respecting the handling and marketing of citrus fruits in the last two numbers of this Journal apply with equal force to this and the following months. Do not think that you can give the fruit too much care and attention; it is not possible, as the better they are handled, graded, and packed the better they will carry, and the better the price they will realise.

Continue to pay careful attention to specking, and fight the blue mould fungus everywhere. Don't let mouldy fruit lie about on the ground, hang on the trees, or be left in the packing-shed; but destroy it by burying. Keep a careful lookout for fruit fly, and sweat the fruit carefully before packing. If this is done, there will be little fear of the fruit going bad in transit, or being condemned on its arrival at Southern markets.

Where the orchard has not been already cleaned up, do so now, and get it in good order for winter. Surface working is all that is required—just sufficient to keep moisture in the soil, keep down weed growth and prevent the packing of the surface soil by trampling it down when gathering the fruit.

Keeping the orchard clean in this manner enables any fallen fruit to be easily seen and gathered and I need hardly state what I have mentioned many times before—that diseased fruit should on no account be allowed to lie about and rot on the ground, as this is one of the most frequent causes of the spreading of many fruit pests.

May is a good month to plant citrus trees, as, if the ground is in good order, they get established before the winter and are ready to make a vigorous growth in spring.

Don't plant the trees, however, till the land is ready, as nothing is gained thereby, but very frequently the trees are seriously injured, as they only make a poor start, become stunted in their growth, and are soon overtaken by trees planted later that are set out under more favourable conditions. The land must be thoroughly sweet and in a good state of tilth—that is to say, deeply worked and worked down fine. If this has been done, it will probably be moist enough for planting, but, should there have been a dry spell, then, when the hole has been dug and the tree set therein and the roots just covered with fine top soil, 4 to 8 gallons of water should be given to each tree, allowed to soak in, and then covered with dry soil to fill up the hole. In sound free sandy loams that are naturally sweet, holes may be dug and the trees planted before the whole of the ground is brought into a state of perfect tilth. It is, however, better to do the work prior to planting, as it can then be done in the most thorough manner, but if this is not found possible then the sooner it is done after planting the better. If the land has been thoroughly prepared, there is no necessity to dig big holes, and in no case should the holes be dug deeper than the surrounding ground either is or is to be worked. The hole need only be big enough to allow the roots to be well spread out, and deep enough to set the tree at the same depth at which it stood when in the nursery. Plant worked trees 24 to 25 feet apart each way, and seedlings at least 30 feet apart each way.

Towards the end of the month cover pineapples where there is any danger of frost; dry blady grass or bush hay is the best covering. Keep the pines clean and well worked—first, to retain moisture; and, secondly, to prevent injury from frost—as a patch of weedy pines will get badly frosted when a clean patch alongside will escape without any serious injury.

Slowly acting manures, such as meatworks manure when coarse, boiling-down refuse, farm manure, or composts, may be applied during the month, as they will become slowly available for the trees' use when the spring growth takes place; but quickly acting manures should not be applied now.

TROPICAL COAST DISTRICTS.

May is a somewhat slack month for fruit—pines, papaws, and granadillas are not in full fruit, the autumn crop of citrus fruit is over, and the spring crop only half-grown. Watch the young citrus fruit for Maori, and when it makes its appearance spray with the sulphide of soda wash. Keep the orchards clean, as from now till the early summer there will not be much rain, and if the orchard is allowed to run wild—viz., unworked and dirty—it is very apt to dry out, and both the trees and fruit will suffer in consequence.

Bananas should be kept well worked for this reason, and, though the fly should be slackening off, every care must still be taken to prevent any infested fruit being sent to the Southern markets.

Citrus fruits can be planted during the month, the remarks *re* this, under the heading of the Southern Coast Districts, being equally applicable here.

SOUTHERN AND CENTRAL TABLELANDS.

Get land ready for the planting of new deciduous orchards, as, although there is no necessity to plant so early, it is always well to have the land in order so as to be ready to plant at any time that the weather is suitable. The pruning of deciduous trees can commence towards the end of the month in the Stanthorpe district, and be continued during June and July. It is too early for pruning elsewhere, and too early for grapes, as a general rule. Keep the orchard clean, particularly in the drier parts. In the Stanthorpe district, I recommend the growing of a crop of blue or grey field peas or a crop of vetches between the trees in the older orchards as a green manure. The crop to be grown as a green manure should have the soil well prepared before planting, and should be manured with not less than 4 cwt. of phosphatic manure, such as Thomas' phosphate, or fine bone dust per acre. The crop to be ploughed in when in the flowering stage. The granitic soils are naturally deficient in organic matter and nitrogen as well as phosphoric acid, and this ploughing in of a green crop that has been manured with a phosphatic manure will have a marked effect on the soil.

Lemons will be ready for gathering in the Roma, Barcaldine, and other districts. They should be cut from the trees, sweated, and cured down, when they will keep for months, and be equal in quality to the imported Italian or Californian fruit. If allowed to remain on the trees, the fruit becomes over large and coarse, and is only of value for peel. Only the finest fruit should be cured; the larger fruit, where the skin is thicker, is even better for peel, especially if the skin is bright and free from blemish. Scaly fruit, scabby, warty, or otherwise unsightly fruit, is not suitable for peel, and trees producing such require cleaning or working over with a better variety, possibly both.

The remarks *re* other citrus fruit and the work of the orchard generally, that I made when dealing with the Coast Districts, apply equally well here, especially as regards handling the crop and keeping down pests.

Farm and Garden Notes for May.

FIELD.—During this month the principal work in the field will be the sowing of wheat, barley, oats, rye, and vetches. There is no time to lose now in this work. Potatoes should be hilled up. Cut tobacco. The last of the cotton crop should now be picked, the bushes being stripped daily after the dew has evaporated. Growers are notified that cotton-ginning machinery has been installed by Messrs. Kitchen and Sons, in the Valley, Brisbane, so that a sure means of disposing of the crop is available (*see* Journal of 1st March, 1906). Every effort should be made to ensure feed for stock during the winter by utilising all kinds of green fodder in the form of silage or hay. Those who own dairy stock will be wise to lay down permanent grasses suitable to the climate and to their particular district and soil. A few acres of artificial grass will support a surprisingly large number of cattle or sheep in proportion to acreage. Couch grass in the West, as has been proved at Barcaldine, will carry ten or twelve sheep to the acre. Coffee-picking should now be in full swing, and the berries pulped as they are picked. Strawberries may be transplanted. The best varieties are Pink's Prolific, Aurie, Marguerite, Haut-bois, and Trollope's Victoria. The Aurie is the earliest and the Marguerite next. In some localities strawberry planting is finished in March, and the plants bear their first fruits in August. In others fruit may be gathered in July, and the picking does not end until January.

KITCHEN GARDEN.—Onions which have been planted in seed beds may now be transplanted. The ground should have been thoroughly cleaned, pulverised, and rolled previous to transplanting. Onions may still be sown in the open on clean ground. In favourable weather plant out cabbages, cauliflowers, lettuce, leeks, beetroot, endive, &c. Sowings may also be made of all these, as well as of peas, broad beans, kohl-rabi, radishes, spinach, turnips, parsnips, and carrots. Dig and prepare beds for asparagus. Full instructions for the successful cultivation of this valuable vegetable will be found in the February issue of the Journal, 1906.

FLOWER GARDEN.—Transplanting and planting may be carried out simultaneously during this month in showery weather; the plants will thus be fully established before the early frosts set in. Camellias and gardenias may be safely transplanted, also such soft-wooded plants as verbenas, petunias, penstemons, &c. Cut back and prune all trees and shrubs ready for digging. Dahlia roots should be taken up and placed in a shady situation out of doors. Plant bulbs such as anemones, ranunculus, snowflakes, freesias, ixias, iris, narcissus, &c. Tulips and hyacinths may be tried, but success in this climate is very doubtful. All shades and screens may now be removed to enable the plants to get the full benefit of the air. Fork in the mulching, and keep the walks free from weeds. Clip hedges and edgings.

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NOTICE.

Queensland Agricultural Journal.

It is hereby notified that the *Journal* will be supplied to all members of Agricultural and Horticultural Societies who do not derive their livelihood solely from the land, on payment, in advance, of an annual subscription of 5s., which will include postage. Schools of Arts will be supplied at the same rate.

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For your convenience an Order Form is attached. A cross on each side of the Order Form indicates to the recipient that his subscription is again due.

Amount of one year's subscription should therefore be forwarded with Order Form, without delay, to the UNDER SECRETARY, Department of Agriculture and Stock, Brisbane.

All subscriptions received for the *Journal* after the seventh day of the month will commence with the month after that on which payment is received. Previous copies available will be supplied at 6d. per copy.

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Agriculture.

ROTATION OF FORAGE CROPS.

By D. MACPHERSON, Manager, State Farm, Biggenden.

The following system of rotation of fodder crops will, I believe, be found to suit the conditions pertaining to dairying in the coastal districts of Queensland. It is a five-year rotation, and comprises the most useful of the fodder crops :—

Divide the area under cultivation into six equal portions. Sow No. 1 with cereals for hay ; No. 2, with mangolds ; No. 3, maize ; No. 4, sorghum ; No. 5, cowpea ; No. 6, lucerne.

In after-plantings keep the following rotation :—

Cereals, mangolds, catch crops, maize, sorghum, cowpea. Catch crops may be panicum, Japanese millet, turnips, peas, rape, &c. In five years, or whenever the lucerne begins to go off, plough it out, and plant maize in that block, sowing lucerne in whichever block had mangolds growing the previous season.

Where practical, a large proportion of lucerne would be an advantage, as it would permit of its being brought into the rotation oftener.

With six equal plots, and allowing lucerne five years to the plot, it would be 30 years before every plot had grown lucerne ; but, with twice the area, every block would receive the benefit of it once in 15 years, and the improvement in forest land, after carrying lucerne for a few years, has to be seen to be realised. Should equal areas of maize and sorghum not balance—i.e., not give enough grain—Kafir corn could be grown for grain instead of so much sorghum.

Carrots and swedes could be used with or instead of mangolds. Cowpea following sorghum, besides providing a splendid hay, improves the soil, and kills out the self-set sorghum as no other crop will.

Mangolds, being one of the best crops to clean the ground, are particularly suitable to precede lucerne.

ILLUSTRATION OF ROTATION.

1st year Maize	1st year Cereal	Lucerne for, say, 5 years ; then plough out and plant with Maize, fol- lowing with other crops in rotation.
2nd „ Sorghum	2nd „ Mangolds and	
3rd „ Cowpeas	catch crop	
4th „ Cereals	3rd „ Maize	
5th „ Mangolds	4th „ Sorghum	
6th „ Lucerne	5th „ Cowpea	
1st year Sorghum	1st year Cowpea	1st year Mangolds and
2nd „ Cowpea	2nd „ Cereal	catch crop
3rd „ Cereals	3rd „ Mangold (catch	2nd „ Maize
4th „ Mangolds and	crop)	3rd „ Sorghum
catch crops	4th „ Maize	4th „ Cowpea
5th „ Maize	5th „ Sorghum	5th „ Cereal.

HOW TO SUCCEED IN LAMB-RAISING.

Buy old sheep, good full-mouthed ewes, and take a couple of seasons out of them ; then get them as fat as you can, and sell them. Don't mind paying a good round price for a ram, and don't make the mistake of letting him run all the year round with the ewes. Either pen him up and hand-feed him, or get someone with a flock of rams to paddock him. Put him to the ewes early in December, and take him out in April. It will pay any man who cultivates 100 acres, and has 100 fallows, to keep sheep. If he cannot keep more, 30 ewes and

a ram will generally return 28 lambs—often far more. These lambs will fetch from 8s. to 12s. and ewes 15s. each. The wool off the ewes is another item, and would yield about 4s. per sheep, or say 12s. for wool and lamb per ewe. On 30 ewes that is £18. The sheep will also keep the weeds down, and supply a good deal of valuable manure. Lamb-breeding can be nothing but profitable, and every farmer should try it.

WHEAT-GROWING IN DRY AREAS.

It is well known that our best wheat-growing soils are situated within the area of precarious rainfall, and if it be possible to bring the enormous territory we possess on the fringe of the reliable rainfall area into reasonably satisfactory wheat production, the potentialities of our production would be increased to a fabulous extent. The question of wheat production on arid areas in America has been given a useful reply by the discoverer of the Campbell system of soil management. The system was extensively written up in our agricultural Press, but our farmers have taken little notice of the matter. Renewed attention will now be given to it in view of the excellent results following its adoption in South Australia. The Hon. T. Pascoe, M.L.C., read an instructive paper recently at the Whyte Yarcowie Agricultural Bureau on the Campbell system, and his results must compel careful consideration by our growers on the outer edge of the agricultural area. Mr. Pascoe describes the results of experiments conducted by Mr. Pearce, the secretary of the society, and himself. The former treated part of his 1906 fallow on the lines of the Campbell system so far as was possible with the implements at his command. The sub-packer which is used in America had to be dispensed with. The Campbell system gave a crop of 9 bags, or 38 bushels per acre, while the ordinary methods with other conditions parallel yielded only 5 bags, or 21 bushels, giving a balance of 17 bushels in favour of the Campbell system. Mr. Pearce's experiments were conducted within the limits of comparatively sure rainfall, and show that the Campbell system will largely increase the yield in such areas. The results obtained by Mr. Pascoe are conveyed in the following crop and rainfall records since 1903:—

		1903.	1904.	1905.	1906.	1907.
		In.	In.	In.	In.	In.
January	...	26	84	1.12	4	8
February	...	86	2.10	17	62	4
March	...	87	67	...	2.14	15
April	...	1.91	26	1.14	...	1.72
May	...	1.11	1.00	1.96	96	85
June	...	1.07	86	1.10	2.90	2.98
July	...	61	1.34	1.82	97	1.46
August	...	1.15	81	43	87	95
September	...	2.46	37	93	1.67	49
October	...	80	2.06	1.54	1.09	66
November	...	4.37	15	...	2.26	1.42
December	...	36	10	...	95	66
Totals	...	15.83	10.56	10.21	14.47	11.46

Averages per acre:—1903, 10 bushels; 1904, not seed; 1905, 3 bushels; 1906, 5 bushels; 1907, nearly 13 bushels.

It will be seen that the rainfall in 1907 was the second lowest since 1903, it being only an inch more than the lowest, which, in 1904, was not sufficient

to produce seed. Yet the Campbell system, though only imperfectly carried out, enabled the land to produce nearly 13 bushels per acre, which is 3 bushels better than was produced in 1903, with a rainfall of close upon 16 inches. Last year (1906) 14½ inches of rain yielded only 5 bushels, and Mr. Pascoe is confident if he had not introduced this system of soil treatment this year's crop would not have exceeded 5 bushels. Mr. Pascoe stated that "the two critical months were not favourable. From the middle of August to the last day of October we had very little rain, the greatest fall in one day being 0.41 on 23rd September, the total during that period being under an inch. We had more hot winds than usual this spring, but as a set-off against the hot winds we had less frosts. In my previous papers I pointed out that it is not always the quantity of rain that falls, but the time when it falls that is vital; and so often, when we have had failures, they have been because just at the critical time when it was needed rain did not come, the wheat went back, and I said, 'If this system will help us over these dry spells, so that the wheat will be able to get the full advantage of the rain when it comes, it will be a good thing.' Now, that is just what it did for me this year, and my wheat never went back." It has been argued by many of our farmers that the Campbell system is not new, and that its programme is that which most of our farmers adopt, but the system is merely the proper carrying out of cultural operations which are improperly carried out under ordinary methods. The system is not revolutionary, but evolutionary. The main points of Professor Campbell's methods are—first, the thorough pulverisation of the top few inches of the fallow previous to ploughing; secondly, the sub-packing of the soil after fallowing. This may be regarded as the central idea of the system. The object is to secure a compact but not solid subsoil, in which moisture may not only be effectively stored, but may also move freely under capillary attraction. Open spaces in soil, or an overloose condition, are fatal to the effective movement of subsurface moisture or its proper retention. It is in order to ensure that that Professor Campbell invented the implement termed the subpacker, which consolidates the subsoil without compressing the surface soil. The next important part of the system is the cultivation of the fallows after rains, with the object of locking in the soil all the moisture that can be stored up for the forthcoming crop. It is unnecessary here to describe the principles upon which this is based. The rest of the system is the application of the same cultivation to the growing crops as long as circumstances permit. It will thus be seen that the whole process is woven around the object of securing the maximum amount of moisture in the soil.

The conclusions Mr. Pascoe has arrived at from his experiments and observations are:—"The conclusion I have come to is this: That while my crop was not a sensational one, it was a long way ahead of anything I could have got by the ordinary system under similar conditions, and I am confident that if the Campbell system be given a fair trial it means bigger yields, better sample, failures reduced by 60 per cent., and comfort taking the place of penury. I believe we are on the eve of a great revolution in the system of farming in these areas. The application of brains to agriculture has done wonders, both for the social status and the pockets of the farmers, inside the rainfall line in recent years, and I see no reason why we should not adapt our methods to our conditions outside, and so reap fair crops in years that would, under present conditions, produce failures, and big crops in years that now produce fair ones." Here is a field of investigation that should fittingly come within the scope of State farm work. The Department of Agriculture might import or have built a Campbell soil-packer, and on portion of the fallows at Narrogin, Chapman, and Nangeenan give a demonstration of the Campbell system of soil management. There is abundant evidence to show that its adoption has made possible and profitable wheat-growing in hitherto unfavourable districts of America, and whatever will increase our wheat yield or widen the area of its profitable production will be a consummation of great national importance.—"Morning Herald" (from the "Journal of Agriculture of Western Australia").

THE SIZE OF CORNSACKS.

The action of the Federal Government in attempting to regulate the size of cornsacks has excited (says the "Journal of Agriculture of Western Australia") widespread opposition amongst farmers in the Horsham and Wimmera districts of Victoria, says the "Australasian," and the local agricultural society has formulated a statement of the case from the farmer's point of view. The following are interesting extracts from the report submitted:—

Statement of cost.

"First.—1,000 standard sacks of 240 lb. are equal to 1,200 reduced sacks of 200 lb., therefore 200 more sacks will be required. It has not been suggested that the price of the reduced sack will be lower than the standard sack, and we know in practice that small reduction in size or quality is never followed by reduction in price. First loss, therefore, is 200 sacks at regular rate of rather over than under 7s. per dozen.

"Second.—The harvester is now in almost general operation, and in practice every sack undergoes a preliminary 'jumping' and filling from the harvester. Second loss—this operation 200 times repeated at 3d. per dozen.

"Third.—The bags, first filled from the harvester and left in small heaps through the paddock at convenient intervals, are then taken and 'jumped,' and filled to the limit, the contents of one or more firstly filled bags being used for the purpose, and then sewn. A hank of twine at 6d. will sew from 55 to 60 bags. The ruling rate in the harvest fields for this process of filling and sewing is 1d. per bag. There will not be a proportionate reduction because of the reduced size. The rate is too much of a standard now. Third loss—cost of time, 1s. 8d.; cost of filling and sewing 200 bags at 1d., 16s. 8d.

"Fourth.—Loading on farm. Loading 200 bags under the conditions obtaining of moving from heap to heap is fair work for two men, and one horse at bag loader, for four days. Fourth loss—loading, 10s.

"Fifth.—Stacking at railway on platform or in 'grain-shed. The ruling rate is 1d. per bag in and 1d. per bag out. It is not suggested that lumpers' wages shall be reduced in proportion to the bag! Fifth loss—stacking and trucking 200 bags at 2d., £1 13s. 4d.

"Sixth.—Carting: The ruling rate for carting is 1d. per bag per mile. Higher for short distances over 10 to 12 miles. The system of charging at per bag is firmly fixed. No change took place when the second-hand bag and the Java bag cropped up. The same rate applies to oats as to wheat, though in the standard sack oats run to only 170 to 180 lb., as against 240 to 260 lb. of wheat. A great proportion of the carting is done by contract, and the value and cost of the work are now too well fixed to hope for change. Taking 10 miles as the average carting distance at 1d. per bag per mile—and keeping in mind that under 5 miles the rate would be higher, this seems reasonable—the result would be: Sixth loss, carting at average rates, 200 bags at 10d., £8 6s. 8d.

Totals.

	£	s.	d.
First, cost of extra bags, 200 at 7s. per dozen	5	16	8
Second, cost of filling and 'jumping' from the harvester, 200 bags at 3d. per dozen	0	4	2
Third, cost of twine, 200 bags at 6d. per 5 dozen, 1s. 8d.; filling and sewing, 200 bags at 1d., 16s. 8d.	0	18	4
Fourth, cost of loading 200 bags	0	10	0
Fifth, cost of stacking, in and out, 200 bags at 2d.	1	13	4
Sixth, cost of carting, 200 at 10d. per bag	8	6	8
Total	£17	9	2

"Taking, then, the case from the humanitarian point of view—

First—Is the standard sack too heavy?

Second—Is the way to meet the difficulty—

(a) To force the farmers to use a smaller sack; or

(b) To force the shipper or stevedore to provide mechanical appliances for stowing the sacks in the ships' holds?

"It is no part of the farmers' case to show that the standard sack is not too heavy until it shall, first of all, have been shown that there is no other way of stowing the sacks in the holds than by the employment of men as beasts of burden. Far heavier commodities than standard sacks are stowed in holds. The farmer, at his end, has been enterprising enough to get hold of the bag-loader; the lumper at the railway station has the horse-whip. Why should the stevedore—a speculator in human labour, if ever there was one—be not taken in hand, and made to use up-to-date means? Why should retrograde methods by him be encouraged at the cost of the farmer? If the farmer is to be encouraged, then economy in production must be encouraged, not opposed. If by making up his product in 1,000-lb. parcels he can economise, then 1,000-lb. parcels it should be. The problem of handling the parcel should be faced and overcome.

"To meet the humanitarian side of the case, while present conditions of loading in the ships' holds necessarily continue, the farmers are prepared to advocate the restriction in size of the wheat sack to the old standard sack of the '44 by 26½, 8 porter and 9 shot.' This size has been well within the strength of the men for the past forty years, but the time has come when the cost of loading the ships must be reduced, not increased. The farmers consider that the energies of the Executive should be directed towards developing cheaper methods of loading vessels. Let the Executive insist on the adoption of modern appliances, rather than, by retrograde step of the kind contemplated, fix on the back of labour for years to come the load of even the 200-lb. sack. The so-called 'unenterprising' and 'slow-going' farmer has taken the bags from the shoulders of himself and his children, by using bag-loaders on the farm; let the Government and the unions do the same for the men."

SCIENCE IN AGRICULTURE.

From time to time someone denies the value of science in agriculture, but the time has since long passed into oblivion when it was necessary to repel the assaults on scientific agriculture. While occasionally a man entirely ignorant of science may be a good farmer, no one can attain the highest success unless he understands the principles which underlie agriculture. He must know something of soils and fertilisers, plant and animal growth, nitrogen's place in agriculture, the nature of and changes which take place in milk, butter, cheese, &c. During the last twenty-five years it has been demonstrated over and over again that a thorough understanding of these general principles and their practical application are great factors in successful farming. We have an institution in Queensland—the Gatton Agricultural College—where these principles are thoroughly taught, and the record of the College shows that those students who went through the three-years' course of practical scientific agriculture, dairying, pig-breeding, &c., are to-day amongst the most successful farmers in the State.

On this subject a writer in a New South Wales exchange says:—

Notwithstanding all that has been said and written about the value of science in agriculture, there are still many people who altogether ignore it. At the last Royal Show, in the section devoted to Government exhibits, an

expert was imparting some scientific information to a number of country visitors. One of them contended that science was not essential to agriculture, and in support of this mentioned that the most successful farmer in a certain district did not know how to read or write. There is always an exception to prove the rule, and occasionally a man totally ignorant of science may be a successful farmer. There is no getting away from the fact, however, that present-day conditions render a knowledge of the principles that underlie agriculture essential to successful farming. During the past quarter of a century this has been demonstrated over and over again. The farmer who cultivates must know something about soils and fertilisers, plant and animal growths, &c. The dairyman must understand the nature and changes which take place in milk, butter, cheese; and the orchardist, in the same way, needs to be posted in the scientific side of the business. A thorough knowledge of these principles and their practical application are great factors in successful farming.

REINFORCED CONCRETE SILO.

This silo is designed to be constructed almost entirely of steel, barbed wire, and cement concrete. The standards or uprights are of 2 inches by 2 inches T section steel bars, tied horizontally with flat bars, locked to the uprights, and with barbed wire, secured to the uprights by strong wire ties. The concrete should be of coarse sand and cement in the proportion of 3 of sand to 1 of cement, and should be run into moulds in position. It is estimated that the rate of progress in construction would be 3 feet per day, so that nine or ten days should suffice to fill in the concrete when the framework is in position. The whole of the roof may be removed in sections quite easily, and replaced without trouble, thus enabling the structure to be completely filled before putting on the roof. When the concrete is once set, the silo is indestructible, neither fire, weather, nor insects being able to make any impression on it. In districts where coarse sand is easily obtained it can be erected quite as cheaply as if of wood. On many farms a suitable position can be found on a slope of ground convenient to the homestead on which the silo could be erected, loaded from a wagon at the top, and emptied on the lower side, the concrete making this quite possible, when with timber it would be impossible.

BOUNTIES ON AUSTRALIAN PRODUCTS. COMMONWEALTH OF AUSTRALIA.

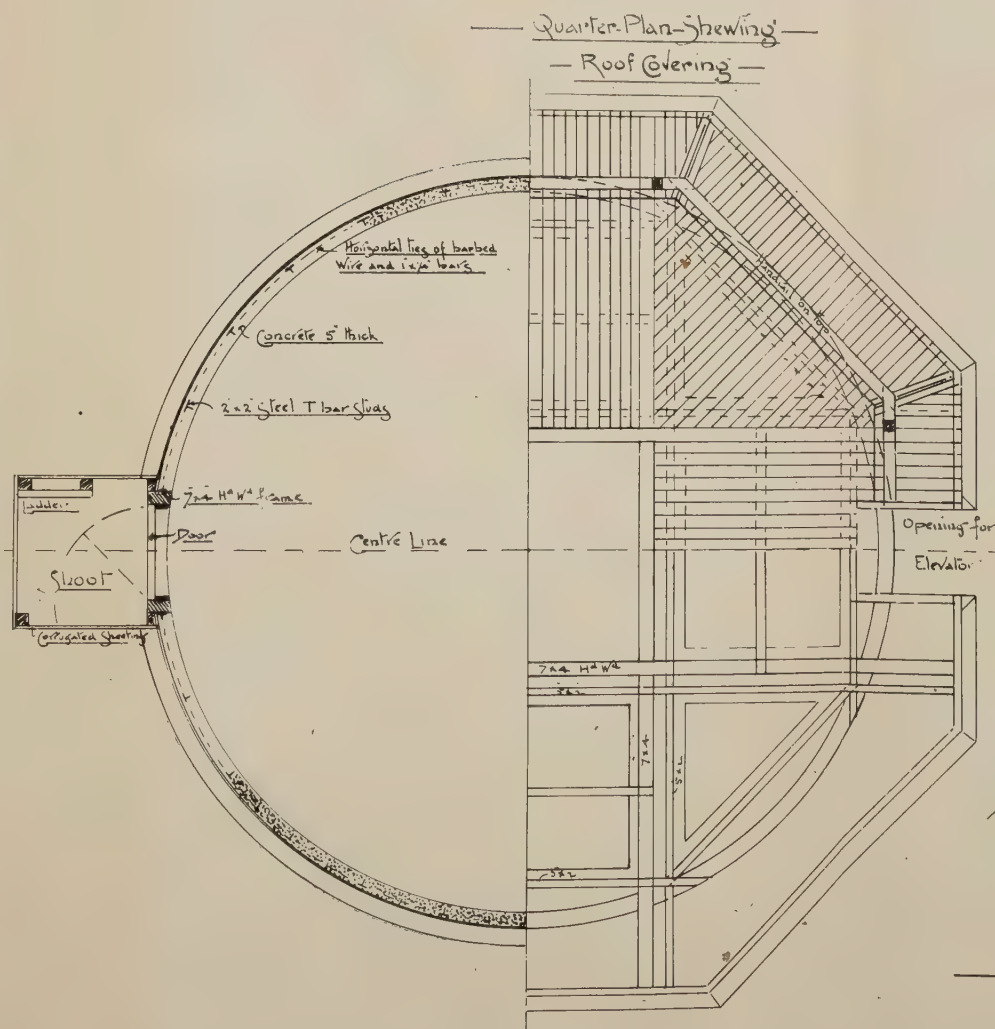
NOTE.—The forms of "Notice of Intention to claim Bounty," and all other forms required by the Regulations, also copies of the Regulations and all information on the subject, may be obtained on application at any Customs Office.

MEMORANDUM FOR THE INFORMATION OF GROWERS AND PRODUCERS:

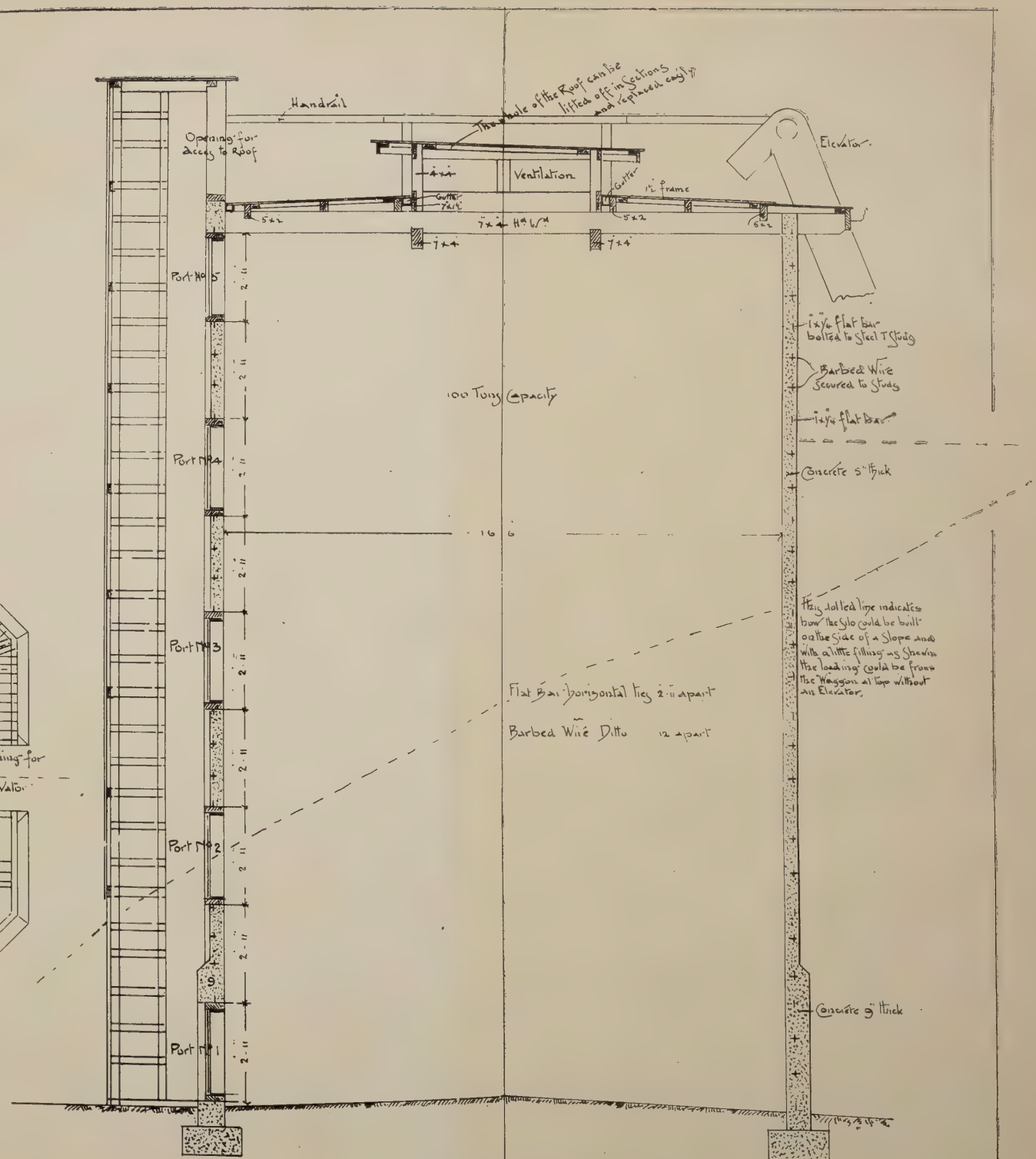
The Bounties Act, 1907, which is now in force, provides for the payment of a total sum of £339,000 (spread over a term of years) as bounty for the production in Australia of certain specified articles.

The First Schedule to the Act, here reproduced, shows the goods upon which bounty is payable, the number of years during which payments will be made, and the rates of bounty, &c.

— REINFORCED CONCRETE SILO —
 — STEEL-BARS: BARBED WIRE —
 — AND PORTLAND CEMENT —
 WITH SAND —
 "INDESTRUCTIBLE — AND — ECONOMICAL" —
 — SCALE — HALF INCH TO ONE FOOT —
 — Designed by — Arthur Morry, Architect —
 — Surveyor to THE MEAT and DAIRY B? —



— Half-Plan-at-A — — Quarter-Plan-Shewing —
 — Roof-Framing —



— Section —



RE-INFORCED CONCRETE SILO.

FIRST SCHEDULE.

FIRST COLUMN.	SECOND COLUMN.	THIRD COLUMN.	FOURTH COLUMN.
Goods on Production of which Bounties are Granted.	Period dating from 1st July, 1907, during or in respect of which Bounty may be Paid.	Rates of Bounty.	Maximum Amounts which may be Paid in any One Year.
			£
Cotton, Ginned	8 years ...	10 per cent. on market value	6,000
Fibres—			
N.Z. Flax	10 years ...	10 per cent. on market value	3,000
Flax and Hemp	5 years ...	10 per cent. on market value	8,000
Jute	5 years ...	20 per cent. on market value	9,000
Sisal Hemp	10 years ...	10 per cent. on market value	3,000
Oil Materials supplied to an oil factory for the manufacture of oil—			
Cotton seed	8 years ...	10 per cent. on market value	1,000
Linseed (Flax Seed)	5 years ...	10 per cent. on market value	5,000
Rice, Uncleaned	5 years ...	20s. per ton ...	1,000
Rubber	15 years ...	10 per cent. on market value	2,000
Coffee, Raw, as prescribed	8 years ...	1d. per lb. ...	1,500
Tobacco Leaf for the manufacture of cigars, high grade, of a quality to be prescribed	5 years ...	2d. per lb. ...	4,000
Fish—			
Preserved as prescribed	5 years ...	½d. per lb. ...	10,000
Fruits—			
Dates (dried)	15 years ...	1d. per lb. ...	1,000
Dried (except currants and raisins) or Candied, and exported	5 years ...	10 per cent. on market value	6,000
Combed wool or tops, exported	3 years, commencing from 1st January, 1909	1½d. per lb. ...	10,000
	1 year, commencing from 1st January, 1912	1d. per lb. ...	
	1 year, commencing from 1st January 1913	1d. per lb. ...	

WHITE LABOUR.

An imperative requirement of the Act is that white labour only shall be employed in the production of the goods upon which bounty is to be claimed.

The only exceptions to the requirements as to white labour are that the employment of any

Aboriginal native, or of any coloured person born in Australia and having one white parent, is not deemed a bar to the payment of bounty.

A coloured person who is the owner, occupier, or lessee of any land or factory in which the goods were grown or produced, or in which the goods have undergone any process, is deemed to be employed in the production of the goods, and if not exempt on account of birth in Australia, and having one white parent, his connection with the goods will prejudice the claim for bounty, unless the Minister otherwise directs.

This provision has the effect of preventing a person whose employment in the service of another would cause the claim for bounty to be rejected, from obtaining bounty as an employer of white labour.

STANDARD WAGES.

The wages paid in the production of the bountiable articles must be the standard wages payable in the place or district. This does not apply to members of the family of a grower or producer.

NOTICE OF INTENTION TO CLAIM BOUNTY.

Any person producing, or intending to produce, any of the goods enumerated in the above Schedule, and desiring to obtain bounty, should fill in a "Notice of Intention to claim Bounty," and forward to the State Collector of Customs, or to the officer in charge of the nearest Customs office.

With regard to any soil products, Notice of Intention to claim Bounty should be sent to the Collector of Customs not later than sixty days after planting. In the event of the crops having been planted before the commencement of the Act, the Notice of Intention to claim should be sent to the collector before the 10th June, 1908.

As to manufactures, Notice of Intention to claim Bounty should be sent to the Collector of Customs at least ninety days before bounty is claimed, but if so requested the manufacturer's notice will be accepted as a continuing notice.

As to any bountiable goods manufactured after 1st July, 1907, and before the commencement of the Regulations, the Minister may authorise payment of bounty if he is satisfied that the requirements of the Act have been complied with, that is, particularly, that white labour has been employed and standard wages paid.

MINIMUM QUANTITIES.

In order to obtain bounty, the grower or producer must have produced not less than the quantities specified in the subjoined table within one financial year—that is, between the 1st July in any one year and the 30th June in the next succeeding year:—

Goods.									Minimum Quantity.
Cotton, Ginned	...	...	...	...	...	...	...	...	250 lb.
Fibres—									
New Zealand Flax	...	...	...	...	...	...	...	...	5 tons
Flax and Hemp	...	...	...	...	...	...	...	...	5 cwt.
Jute	...	...	...	...	...	...	...	...	10 cwt.
Sisal Hemp	...	...	...	...	...	...	...	...	1 ton
Oil Materials—									
Cotton Seed	...	...	...	...	...	...	...	...	5 cwt.
Linseed	...	...	...	...	...	...	...	...	5 cwt.
Rice, Uncleaned	...	...	...	...	...	...	...	...	1 ton
Rubber	...	...	...	...	...	...	...	...	2 cwt.
Coffee, Raw	...	...	...	...	...	...	...	...	250 lb. of coffee beans
Tobacco Leaf	...	...	...	...	...	...	...	...	5 cwt.
Fish, Preserved	...	...	...	...	...	...	...	...	5 tons
Dates	...	...	...	...	...	...	...	...	10 cwt.
Dried Fruits	...	...	...	...	...	...	...	...	5 cwt.
Combed Wool Tops	...	...	...	...	...	...	...	...	1 ton

QUALITY.

The Act provides that in every case the goods produced must be of merchantable quality, and, with regard to certain foodstuffs—namely,

- Coffee, raw,
- Dates,
- Fish, preserved,
- Fruits, dried or candied,
- Rice, uncleaned—

the Regulations require that in every case the goods shall be sound and of good marketable quality. The quality prescribed with regard to tobacco leaf is determined by its selling value. No bounty will be paid upon tobacco leaf unless there is satisfactory proof of sales to a *bonâ fide* purchaser at a price of not less than 1s. per lb., or on proof that the leaf is equal in quality to that which is usually sold at 1s. per lb.

PARCHMENT COFFEE.

If coffee, upon which bounty is claimed, has been delivered at a factory in the form of parchment coffee, evidence must be supplied as to the weight of coffee beans obtainable or obtained from the particular delivery.

DELIVERY AT FACTORY, SALE, OR EXPORT.

The goods upon which bounty is claimed other than those which are essentially factory products must be delivered to a factory which, unless the Minister otherwise approves, should be within the State, or may be dealt with by way of *bonâ fide* sale otherwise than for delivery to a factory or, except in the case of cotton seed or linseed, may be exported. The Act requires that cotton seed and linseed upon which bounty is claimed shall be supplied to an oil factory for the manufacture of oil. The premises of a grower may be considered a factory if they are furnished with the necessary appliances for treating any of the products in the schedule above.

SPECIAL PROVISIONS AS TO MANUFACTURES.

For the purpose of convenience, three items—namely,

Fish, preserved,

Fruits, dried or candied (except currants and raisins),

Combed wool or tops—

are spoken of as manufactures. As to two of these—namely, dried or candied fruits and combed wool or tops—the bounty is not payable unless the goods have been exported, and with regard to all three the bounty is payable to the manufacturer and not to the primary producer.

Dried or candied fruits, upon which bounty is claimed, must be packed in a manner approved by an officer of Customs, and the packages when tendered for shipment must bear such trade description as is required by the Regulations of the Commerce Act.

DIRECTIONS AS TO GOODS EXPORTED.

Persons intending to claim bounty upon those items as to which export is necessary and as to any other bountiable goods which it is desired to export before bounty has been paid must—

- (a) At least one week before shipment give notice to the collector at the port of export of intention to export such goods.
- (b) Comply to such an extent as may be required by the collector with the provisions of the Customs regulations relating to drawbacks in respect of—
 - (1) Notice of intention to pack ;
 - (2) Packing ;
 - (3) Entry for drawback ;
 - (4) Payment for officers' services.
- (c) Furnish to collector or to any authorised officer, on demand, and without charge, fair samples of the goods to be exported.
- (d) On demand furnish free of charge, to any officer of Customs, samples of the bulk of the goods when tendered for shipment.
- (e) Furnish to the collector a statutory declaration that the goods exported or to be exported are wholly of Australian origin.

ACCOUNT SALES.

In case of bounty payable only upon exportation of goods, the Minister may, before payment of bounty, require the production of account sales of the exported goods, and satisfactory verification of those account sales.

SPECIAL PROVISIONS AS TO FISH, PRESERVED.

The term "Fish, preserved," is deemed to include fish put up in tins, smoked fish, salted fish, and dried fish. The fish must have been caught in Commonwealth inland waters or seas surrounding Commonwealth shores, and, in the case of sea fishing, from boats owned in the Commonwealth.

CLAIM FOR BOUNTY.—TIME WITHIN WHICH TO BE MADE, &c.

The claim for bounty must be made in duplicate and forwarded to the State Collector of Customs or to the officer in charge at the nearest Customs house within thirty days after the date of—

Delivery to factory, or

Sale within the Commonwealth, otherwise than for delivery to factory,
or

Export.

With regard to manufactures, in the case of goods upon which bounty is payable only on exportation, the claim for bounty must be made within thirty days after exportation.

As to fish, preserved, claim should be made within thirty days of completion of manufacture, or at regular intervals that may be arranged with the State collector.

As the Act fixes a maximum amount which may be paid as bounty in any financial year on any particular product, it is necessary for the department to know, at as early a date as possible, the whole amount of the claims for that year, and the Regulations accordingly provide that claims for bounty on natural products should be lodged before the 1st April in any year and on manufactures before the 1st May.

Any claims lodged after those dates in any financial year will, unless the Minister otherwise directs, be considered in relation to the funds available for the payment of bounty in the next financial year. (See also next paragraph.)

PROPORTION OF BOUNTY PAYABLE IF AMOUNT AVAILABLE NOT SUFFICIENT TO
PAY THE WHOLE.

If the recognised claims for bounty in any one financial year exceed the amount fixed by the Act as payable during that year in respect of any one item the amount available will be distributed proportionately. The Act provides that if the maximum amount payable on any item has not been wholly expended during a particular year, it will be available for distribution in any subsequent year of the period during which bounty may be paid, as an addition to the maximum for that year.

PURCHASER'S CERTIFICATE.

Where a grower claims bounty upon goods which have been sold to a manufacturer or otherwise, he should obtain from the purchaser a certificate showing the quantity purchased and the price paid.

PROOF AS TO VALUE.

The bounty is in many cases a percentage of, or dependent upon, the market value of the goods, and in all such cases the Collector of Customs is at liberty to require any reasonable proof to be furnished as to the value put upon the goods by the claimants for bounty.

Department of Trade and Customs,

Melbourne, 16th March, 1908.

A CHEAP SILO.

The accompanying illustration of an effective and very cheap silo has been forwarded to us by Mr. Arthur Jones, of Bondoola, near Rockhampton. The drawing was so carefully compiled by an officer of this Department that there appears to be no necessity for printing the whole of the specification accompanying the rough sketch. The illustration speaks for itself.

Mr. Jones writes:—

In the "Queensland Agricultural Journal" several types of silos have been described, but all are costly and beyond the reach of struggling selectors unless they are so fortunate as to be near a sawmill. To help such, I have thought out a type of silo that can be erected by any bush carpenter or any man who can erect a good two-rail fence. The material for it can be obtained on most selections; timber that will split into only 4-inch wide billets will do, provided they are straight. I am sending you a ground plan and part of the side elevation (to show the posthole and how it is constructed) of a square silo to hold 96 tons of silage. (An octagon or polygon would hold more in proportion to the side area, but would be more difficult to make.) The material for the silo under consideration consists of 500 6-inch slabs, 6 feet long. Where wider slabs can be got, a less number will do. Four posts, 30 feet long, with not less than 5 inches of redwood at the top; 5 feet of the bottom of each must have all the sapwood removed—this is the depth to which they are sunk into the ground. Also 20 poles for beams, 19 feet long, with not less than 5 inches redwood at the small end; the posts and also the beams must be of a variety of timber that will bear a good strain. The slabs are dressed for the first 6 inches on the sap side to a straight line of sufficient depth to cut out the sap at the edges, also without wind. The inside is then dressed to a straight line from end to end, and 2 inches thick at each end (do not touch the edges, the more splinter and the rougher they are the better). The slabs should be split and dressed six months before they are used, that they may have time to shrink. Forty 6-inch spikes, $\frac{3}{8}$ -inch or $\frac{1}{2}$ -inch in thickness, and a quantity of 4-inch stout nails (No. 6) for nailing on the slabs. One hundred and twelve of the slabs should be 6 feet 6 inches long; these are for the two opposite sides of the lower set of slabs, also to finish up even at the top. The 20 beams should be squared to 4 inches at each end for 2 feet from each end, and one face taken right through for the slabs (which are vertical) to rest against. Mark out the holes for the posts. If a peg is first driven in the centre and a circle of 21 feet 6 inches described, this circle will be the exact inside of the posts where they are dressed for the beams to fit against—that is, the posts will be 21 feet 6 inches apart across the angles, and 15 feet apart along the sides. The holes should be sunk 5 feet deep if the insides of the holes are sunk perpendicularly (take care before putting in the posts to see that this face is true perpendicular), and the outer end sunk in steps, and all the earth taken out must be placed a little further out, as high as it can be heaped. By doing this, if the posts are rolled up a plank or slab on to the top of these heaps, much labour is saved in the lifting. Two chalk lines struck along the inner wall lines (at right angles) are struck on each post before they are put up; also a small nail should be driven into them at intervals from top to ground line. This is to pick it up if rain or something else should obliterate the line. A straightedge placed against these nails will, with a plumb rule, enable such post to be placed perfectly true. After the posts are up, all earth that could not be rammed into the holes should be shovelled into the centre of the silo space to raise the floor, and more must be added to raise the inside an inch or two. Two of the beams are spiked on, one at the opposite side to the other, at exactly the same level, also same level at both ends, taking care to keep the faced sides inwards. The post will need to be dressed or notched-in to allow of this being done. (I think it preferable to do this as the work proceeds, for if the posts are faced on the ground they spring too much; if wire

was stretched across from post to post at the top, it would prevent them spreading at the top.) Two more beams are now spiked on to the opposite spaces, completing the square, and keeping the faced sides inwards. A complete square is now spiked to match the two length of slabs, the two opposite sets being 4 inches higher than the other two; this makes a strong corner. After this, each side set will be exactly 6 feet from centre to centre for exactly 6 feet slabs, and the slabs must be cut to that length exactly. At the top two different lengths are needed to level up when all the beams are up, and care should be taken to keep all the posts the same distance apart each way; if too wide, to spring them in before spiking the beams on. The slabs are nailed on with the sap side outwards, and placed so that the heart or red wood touch at the outer edge; should sapwood interfere, it should be dressed off on the outer side. As the slabs will vary in width at each end, they will have to be reversed to keep the leading side plumb. Select one side of a square for the post holes—a side most convenient for feeding—taking care not to put them on a side you are likely to need in extending the silo at some future time.

It will be noted that at the edges of the slabs are V-shaped spaces. These I propose to fill either with bricklayers' mortar or pug them up with surface soil containing 2 parts of sand to 1 of clay. Any soil which will not crack in drying is suitable. If all the splinters are left on the edges of the slabs, the mortar will remain in the spaces for years. Such a silo can be built for a few pounds of actual outlay.

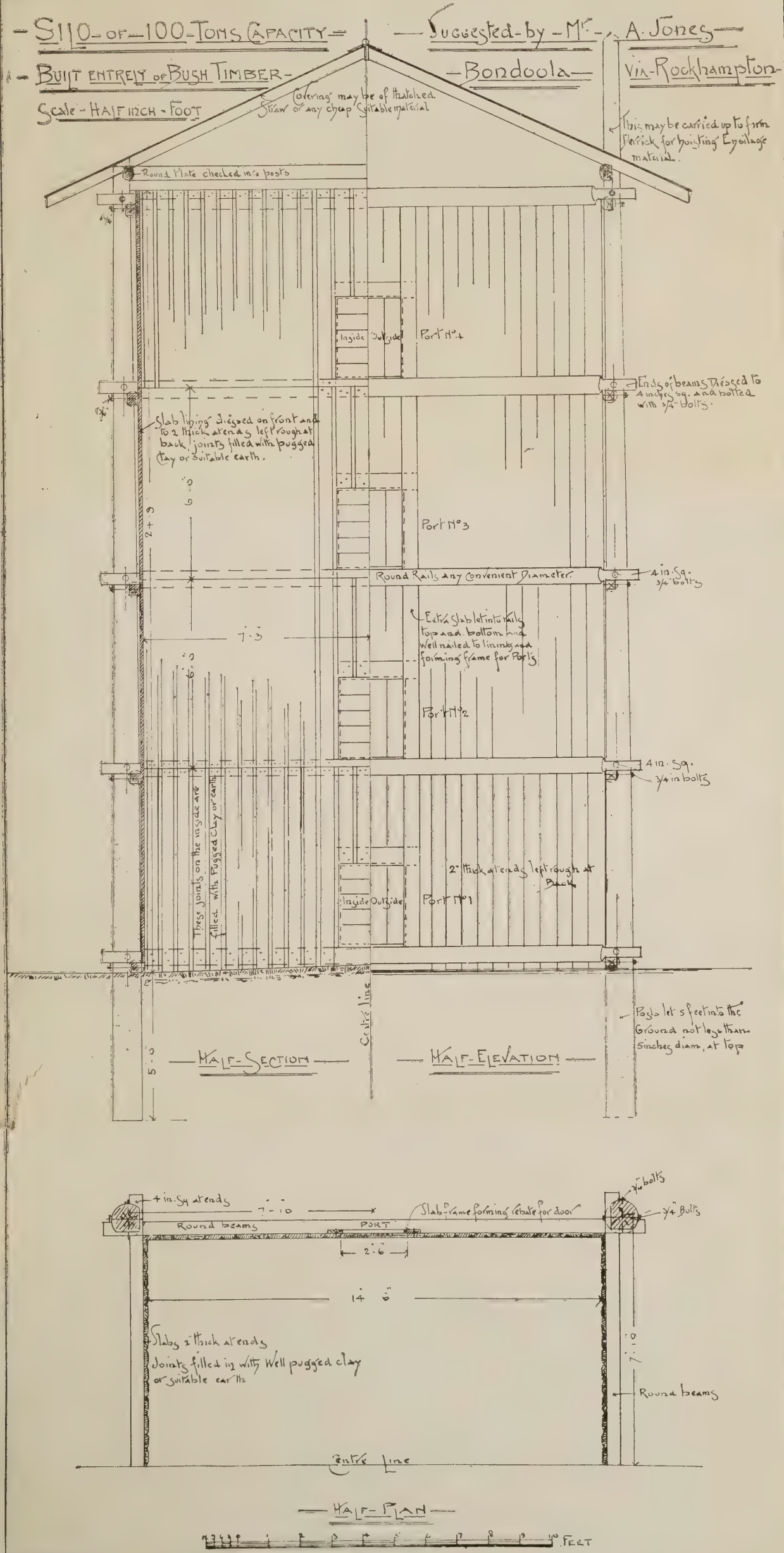
A silo of the above dimensions, capable of holding 100 tons, contains sufficient to feed 30 cows for a period of 180 days, giving to each cow silage at the rate of 40 lb. a day. It can be filled by the one crop of maize grown on 6 acres, sown thickly, say 6 inches apart, in rows spaced at a distance of 15 inches apart. The maize is not cut till the grain is fully glazed and nearly fit to pull. If cut at this stage the stalks are full of sugar; at an earlier stage the stalks sour; on the other hand, if cut later they become woody and useless. The above 6 acres should give a surplus of 20 tons to provide for a partial failure. In those parts of the State where two crops can be obtained from the same ground in one season, two of such silos could be filled from the above 6 acres.

Certainly this ought to be within the reach of most farmers, and, if provided, would certainly prevent, or greatly lessen, the heavy losses in cattle, also in cream and butter, during our constantly recurring droughts.

TICKS ON DOGS.

Valuable dogs are often killed owing to the attacks of scrub (not cattle) ticks. If the ticks are promptly removed, a dog will usually recover, but if they are not detected the animal rarely survives. In the case of woolly-haired dogs the insects are difficult to find, in which case the dog may be sheared and the ticks removed. They should not be forcibly pulled off, as the mandibles are invariably left in the animal's skin, and the mischief goes on. Insects breathe through their bodies, hence, if the pores are closed by the application of oil, turpentine, or kerosene, the tick dies, and may be extracted entirely. If the ticks cannot be found, the following dressing may be found of some service:—

Soft soap, 4 oz.; kerosene, 1 teacupful; water, 1 quart. Boil the soap and water together until the soap is dissolved. When cool, add the kerosene, and agitate the mixture thoroughly for five minutes with a rod. Wash the dog all over with some of this mixture. Give internally 3 to 10 gr. of iodide of potassium in two tablespoonfuls of water. The above recipe is recommended by Mr. G. Tucker, Veterinary Surgeon, Department of Agriculture and Stock.



A CHEAP SILO.

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE,
GATTON.

RETURNS FROM 1ST TO 31ST MARCH, 1908.

Name of Cow.	Breed.	Date of Calving.	Yield of Milk.	Babcock Test, Per cent. Butter Fat.	Commercial Butter.	Remarks.
			Lb.		Lb.	
Glen ...	Shorthorn ...	10 Feb., 1908	814	4.7	42.84	First calf
College Lass ...	Ayrshire ...	1 Sept., 1907	673	5.2	39.19	
Eve ...	Jersey ...	27 Aug. "	531	5.7	35.10	
Comet ...	Holstein-Ayrshire	23 " "	507	5.5	31.23	
Graceful ...	Guernsey-Sh'rth'n	14 Jan., 1908	704	3.9	30.75	
Conceit ...	Ayrshire ...	28 Oct., 1907	607	4.4	29.91	
Beauty ...	" ...	20 Dec. "	719	3.7	29.79	
Clare ...	Jersey ...	21 Aug. "	412	6.4	29.53	
Auntie ...	Ayrshire ...	2 Sept. "	529	4.7	27.74	
Honeycomb	S.C. Shorthorn...	23 Aug. "	683	3.6	27.54	
Ivy ...	Jersey ...	5 Feb., 1908	598	4.1	27.45	Slipped calf
Mona ...	Holstein-Sh'rth'n	Oct., 1907	727	3.3	26.86	
Laura ...	Ayrshire ...	20 May "	646	3.7	26.77	
No. 112 ...	Grade Jersey ...	23 Aug. "	530	4.4	26.18	
Bee ...	Jersey ...	16 Jan., 1908	407	5.7	25.99	
Olga ...	Shorthorn ...	24 Feb. "	677	3.4	25.78	
Cocoa ...	Jersey ...	20 Nov., 1907	636	3.6	25.64	
Bliss ...	" ...	17 Sep. "	486	4.7	25.58	
Dot ...	Shorthorn ...	Aug. "	584	3.9	25.51	
Careless ...	Jersey ...	20 Oct. "	612	3.7	25.36	
No. 1 ...	S.C. Shorthorn...	2 Dec. "	701	3.2	25.12	
Dora ...	Shorthorn ...	9 Sept. "	589	3.8	25.06	
No. 48 ...	Grade-Shorthorn	18 Jan., 1908	638	3.5	24.91	
Gem ...	Shorthorn ...	29 Aug., 1907	594	3.7	24.61	

The heavy rains, together with the continual source of annoyance from mosquitoes during the month, detracted from the milk yield very much.

CURES FOR SCOURS AND REDWATER.

Mr. John Macdonald, Stone's Corner, gives what he considers to be a certain cure for scours in calves. The remedy is:— $\frac{1}{4}$ lb. of butter mixed with a tablespoonful of baking powder, and made into a soft paste. This is put down the calf's throat, and the cure is effected in two hours. He says that this is also a capital cure for hoven.

In the case of redwater, he states that he had a cow eight years old, which had been ill for three days, and was not expected to live. He bled her in the nose, and cut off two lower joints of the tail. He then gave her a full quart of castor-oil to which a spoonful of turps was added. Her temperature before this treatment was 108 degrees. He then let her out, the temperature having decreased to 107 $\frac{1}{2}$ degrees. She was allowed to drink as much water as she liked. Next morning she was dosed with 1 pint of linseed oil, $\frac{1}{2}$ -oz. of saltpetre, and a piece of brown resin, about the size of walnut, pounded fine. He did no more for a day or two, and then gave her oatmeal gruel. In four days the cow was much better. She slipped her calf at five months. Since then she has been giving 15 quarts of milk a day. She took the bull six weeks after being treated as above, and is due to calve in about six weeks (May). Altogether she was ill for three weeks, when she began to pick up, and Mr. Macdonald considers her now worth £15. She is a Jersey-Shorthorn, eight years old, and during the whole period of her illness she never went dry, but was milked daily.

THE KICKING COW.

A common question asked all round the world is how to deal with a kicking cow. The proper reply to this inquiry (says "Dairy") is: Do not keep a kicking cow. At the same time, every dairyman knows that kicking, as applied to cows, is a relative term, for, in one sense, every cow is at some time in her life more or less handy with her hind feet. A confirmed old kicker, one that appears to go asleep while you are filling the pail, and just as it is filled discovers a fly on her belly, and makes a vicious lunge at it. Well, we would write that cow's obituary on short notice. You had better not trust her, if you are satisfied that she kicks from habit rather than from some disturbing cause. In the latter case you must look for the trouble, and remove it. She may be naturally sensitive or tender about the udder and teats. In that case, the milking should be begun slowly, and continued cautiously, while the cow is uniformly treated kindly. No other treatment will effect a cure. When a cow, having some local trouble that with proper handling will wear off, is treated roughly, and especially if she is tied up, or other elaborate precautions are taken against her, she is almost certain to become a confirmed kicker, for the reason that the milker, feeling safe, is sure to be rough with her, and hurts her to that degree that she resents it, and learns to dislike being milked. Especially is this the case with heifers. Bear with them to the last limit of your patience before putting them into any kind of harness. A man with a strong left arm, by a quick motion can stop the blow before it gathers headway, and thus discourage the heifer before she learns how much mischief she can do with her hind feet. Those dairymen who have cows that need to be leg-roped to milk do not know that this is a sign of a poor dairyman. No one ever saw such a thing in a well-regulated dairy. They are as useless as they are a nuisance, and the man who has not the patience to cure the fault, provided he is a young one, had better go into some other business.—"The Dairy."

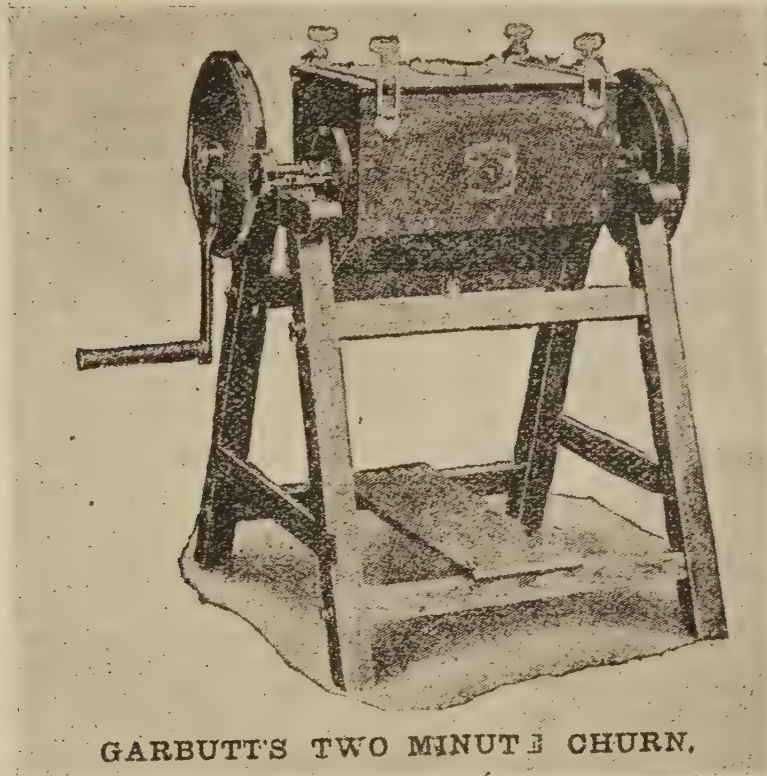
ANGORA GOATS.

It is frequently asked: Will Angora goats pay to breed? The answer to this is: Look over the fence and see what your neighbour, who keeps Angoras, has done. Say you have a homestead, or any kind of selection, of 160 acres. On that you can run 50 Angoras. The mohair from these is worth £20 per annum. But, besides this, you have the increase, which you can sell. Then there are the old goats, which can be killed, and their skins are worth 1s. 8d. per lb., and the skin weighs from 4 lb. to 5 lb. The fleece of an Angora weighs from 3 lb. to 5 lb., according to quality, and the quality varies with the purity of the breed. The fleece of a good buck weighs from 6 lb. to 9 lb., and the value of the fleece of a pure Angora is from 1s. 3d. to 1s. 8d. per lb. Half-breds scarcely pay for shearing. Now, say the average fleece weighs 4 lb., and the average price 1s. 6d. per lb., then each fleece produces 6s. It is easy to calculate what a flock of 100 goats would bring in. The principal items of expenditure would be—shearing, at £1 a score, baling, and freight. In good scrubby country the goats will feed themselves, so that there is very small expenditure for forage. On most hill farms there is to be found a proportion of stony or scrubby country, useless for grazing either sheep or cattle, and quite unfit for cultivation. There the Angora goat will thrive, hence it would be to the advantage of anyone owning such land to start a small flock of these valuable animals.

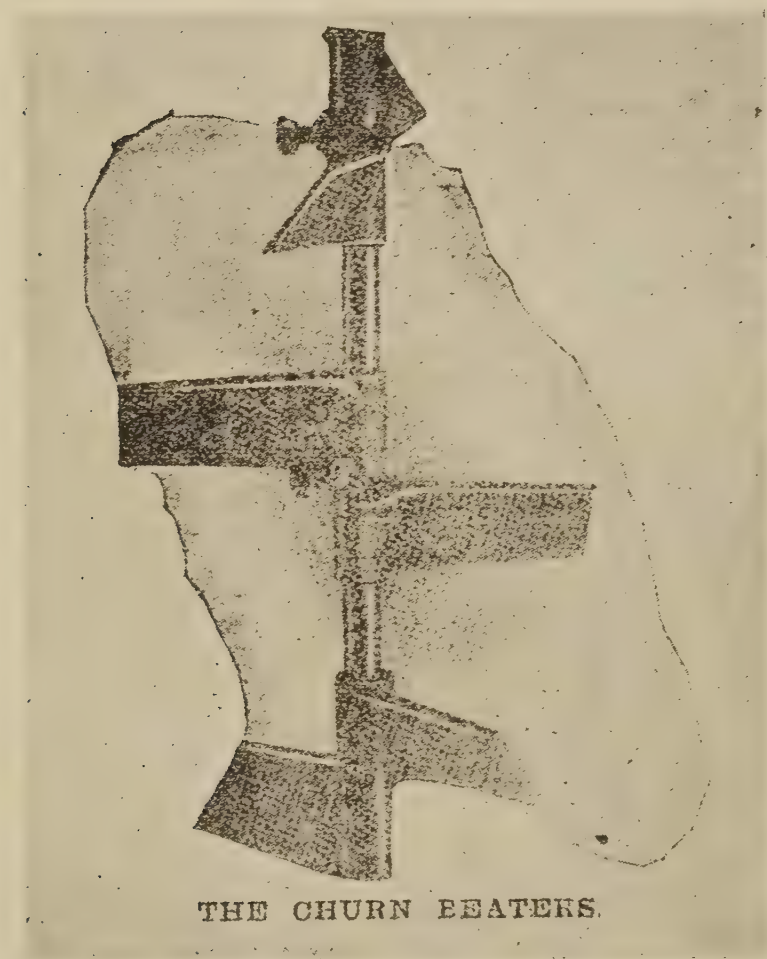
GARBUTT'S TWO-MINUTE CHURN.

At a recent London dairy show Garbutt's Improved Patent Two-minute Churn was a great attraction, and the various trials showed its efficiency, but since then it has been put to severe tests by Mr. J. Benson, the well-known dairy

expert of Buxton, and it has also come through these with the utmost success, thus fully justifying the claims of the manufacturers, Messrs. R. Boby, Limited, St. Andrew's Works, Bury St. Edmunds—viz., that the very best butter can be obtained by the use of this churn in an average time of "two minutes," either winter or summer; that the yield is increased; that the butter is superior



GARBUTT'S TWO MINUTE CHURN.



THE CHURN BEATERS.

in texture, colour, and flavour; that very great saving of time and labour is effected; and that the churn is especially easy to clean.

Mr. Benson reports that he made a large number of churning tests under various conditions of temperature, &c., and was very well satisfied with the

results obtained, it possessing the following advantages over the churns generally in use in this country:—

1. The actual churning of the cream occupies only about one-twelfth of the time necessary when churning in the ordinary way.
2. It churns the cream more efficiently—*i.e.*, there is less butter fat left in the butter milk.
3. It will churn equally well either thick or thin cream.
4. The colour of the butter is generally better and brighter, especially when churning thick cream.
5. The churn is more easily washed and kept clean.

Unlike many other quick-acting churns, this churn does not incorporate an excess of water in the butter produced. On analysis none of the numerous samples contained more than 13 per cent. of moisture. This is important, in view of the requirements of the Butter Bill, which came into operation with the new year, and which limits the water content of butter to 16 per cent. As bearing on the question of the time required to produce butter, in the final tests made by Mr. Benson four 2-gallon lots of cream were churned in one churn, washed, brined, and worked on the butter-worker within one hour. The churning temperatures varied between 54 and 60 degrees Fahr. The actual churning of the cream occupied $2\frac{3}{4}$ minutes at the lowest temperature, and $1\frac{1}{2}$ minutes when churned at 60 degrees Fahr. The fat left in the butter milk averaged only .34 per cent.—a remarkably good result, whilst all the butters made were of excellent quality, but the best results were obtained at 54 degrees Fahr.

In concluding, Mr. Benson says the churn requires more power to drive it than an ordinary churn, but as the time taken is short this is not appreciable.

Some notes on the construction of the churn may prove of interest. It is built on a substantially-constructed pitch pine frame, strongly stayed for preventing vibration. The body of the churn is fixed in position, and does not turn. It is octagonal in shape, built of oak, the top or lid being of mahogany. The main spindle is of mild steel, driven by machine-cut gearing. The spur wheel gears on to a pinion increasing the speed of dashers to 400 revolutions per minute.

The churn is fitted with adjustable glands and lignum-vitæ tapered bushes, effectually preventing the cream from passing through the gland bearings. To the end of the main spindle a balance fly-wheel is affixed which ensures smoothness in running and ease in turning.

The dashers or beaters are simple in construction, and can in about two seconds be easily removed all in one piece, as illustrated below, for cleaning purposes and for the extraction of butter.

The interior of the churn then presents a perfectly plain surface, from which every particle is readily rinsed, the bottom being grooved, gravitating towards the discharge outlet, facilitating cleaning.

The top or lid of the churn is fitted with a large-size, circular, metal-framed, plate-glass inspection door (made easily detachable), and the opening thus formed serves for charging the churn with water for washing the butter, thus obviating the necessity for the removal of the lid until the butter is to be taken out.

The time taken to produce butter is considerably accelerated by a special form of air valve, which permits circulation of air through the cream during churning, giving to the butter excellent "keeping" qualities.—"Mark Lane Express."

Poultry.

PRESERVING EGGS.

When eggs are plentiful, the market falls to a non-paying point, especially when poultry food is dear. Then comes a time like the present, when the price rises to 1s. 6d., and, in March last, to 1s. 9d. per dozen. Nothing is easier than to obtain high, or at least remunerative, prices for eggs laid during the year. This can be attained in a most simple manner by preserving the eggs during the season of plenty.

There are two good and cheap methods of keeping eggs in a perfectly fresh state for a year or even longer. One is, by packing them in a jar and covering them with limewater, and the other is by covering them with a solution of water-glass. This is the better method, although both are good.

LIMEWATER SOLUTION.

Take 16 oz. of quicklime and thoroughly slake it in 1 gallon of cold, previously boiled, water. Stir it well, allow it to settle, then draw off the clear solution. Some mix 6 or 8 oz. of salt with the lime, but we have not found this necessary, especially as the strong brine eventually penetrates the shell and gives a salt flavour to the egg. Now, select your eggs, rejecting all that are cracked, dirty, or which give signs of age; place them in a stone or glass jar, or in a galvanised-iron vessel. We have successfully preserved them in a kerosene tin. Now, pour the clear lime water over them, and allow the upper layer of eggs to be 3 inches below the surface. Close the vessel tightly, and place in a cool dark pantry or cellar.

WATER-GLASS SOLUTION.

Water-glass is silicate of sodium. It is a thick liquid, almost transparent, and is colourless and devoid of any odour. If the water-glass has been contained in any vessel—say, a barrel—where it may have come in contact with iron in any shape, it will have a yellowish tinge, and should be rejected.

To prepare it for use, thoroughly mix, for every quart of the water-glass, 9 quarts of boiled water. As soon as it is cold it is ready for use. As with the limewater process, choose only bright, clean, fresh eggs, and pack them small end down in stone, glass, galvanised-iron, or pure tin vessels. Pour the solution over the eggs in the same way as in the limewater method, leaving the top layer 3 inches below the surface. Cover tightly and keep in a cool place until required for use. When the eggs are to be removed, draw off the solution and wash them. By these simple means eggs which at some seasons will bring only 4d. per dozen may be safely kept until higher prices rule.

EGG-LAYING COMPETITION AT ROSEWORTHY, S.A.

Mr. John Mahon, Principal of the Queensland Agricultural College, Gatton, forwards us the following copy of a letter received from Mr. A. H. Padman, Adelaide, South Australia, who was the winner of the egg-laying competition, lately concluded, in regard to the performance of his pen. (The letter is dated 28th March, 1908):—

“Ere this reaches you, the finals will be out. I hope for 1,540. (The Gatton score for Mr. Padman’s pen of White Leghorns was 1,538.—Ed. Q.A.J.) The record is with you. Roseworthy will finish with between 1,520 and 1,530. Mrs. Kinnear’s pen has given me a great run, and has still an equal chance with mine of winning—not 20 eggs between us for twelve months. Trust my pen will get away safely to Mr. James. They will probably moult heavily after

the voyage. I shall esteem it a favour if you will accept the reserve birds, if any, as a slight recognition of my appreciation of the wonderful record put up under your care. If you can allow the actual attendant to have some benefit, I shall be pleased. I desire to record my great thanks to you for your unfailing courtesy and compliance with my various requests for information and figures throughout the competition now finishing. I trust at some future time to be represented again under similar conditions."

Mr. Mahon adds:—"I may state that the final figures in the Roseworthy competition give Kinnear (first) 1,531 eggs, and Padman (second) 1,528 eggs. The pen competing here (Gatton) is to be sent direct to New Zealand, where a Mr. James, of Auckland, has purchased the six birds for £35."

In a later letter Mr. Mahon states that he has been offered £4 4s. for the two White Leghorns presented to the College by Mr. Padman. It is, however, intended to keep them, mate them with one of the best College cockerels, and raise as many chickens as possible from them. A limited number of settings will be available for disposal at £1 1s. each, f.o.b. Gatton.

BEWARE OF CARBOLIC ACID.

A medical man gives a decided warning against the free use of carbolic acid on the poultry. In reply to the query, Would you please explain why some people claim that they have had great success in curing diarrhoea in their chicks by the use of carbolic acid, when others claim the contrary? he says:—

As to the wonderful properties of carbolic acid (carbolic) I shall herewith give for your own benefit and that of all readers an extract from the price-crowned work on "War-Surgery," by Professor Esmarch, M.D., the world-famed surgeon and professor of surgery, a surgeon-general of the first class in the German army, and a member of most of all the important scientific bodies of the globe. He says:—

Carbolic acid is a very effective antiseptic. A watery solution of 1:100 stops upon longer contact the development of microbes: the germ development becomes entirely inhibited, though only after a twenty-four hours' contact with a concentrated solution of 5:100. Solutions in oil or alcohol are, according to Professor Koch (the famous Cholera-Tubercle Koch), without any antiseptic effect. But carbolic acid is very poisonous, and that not on internal use only. For even when applied externally in the form of washes, compresses, &c., to wounds, abrasions of skin, and even the normal skin, it is easily absorbed into the system, and does (particularly in children, but also in those adults who are suffering from cachetic conditions, anæmia, kidney troubles, &c.) cause quite often very severe symptoms of poisoning, acute (collapse), as well as disturbance of digestion, vomiting, maramus.

It also irritates the skin, particularly when used moist, and causes erythema and eczema, often combined with high fever, and strong solutions irritate the surface of wounds to such an extent as to cause severe secretions, yea, even as Lister called it, antiseptic putrefaction—gangrene!

The professor adds: "Carbolic acid is, therefore, much less used now than it was in the days of Lister, when it dominated as an antiseptic."

This was written by one of the foremost authorities in the medical world in 1885, has been recognised and acknowledged as true by others, but, alas, now after a lapse of twenty years, carbolic acid is still the standby of profession and laity!

We have treated this question at particular length because the belief in the healing power of carbolic acid is so general among the people, and its true nature is so little known. We must warn our friends of its use, to protect them, their families, and fowls, which already have to stand so much maltreatment.—Exchange.

The Orchard.

SOME GOOD SPRAYS.

Spraying must be done thoroughly. By thoroughly is meant that the tree should be wet all over, and on both sides of the leaves. It should be enveloped in a mist-like spray (just enough to damp it). An insect or a fungus growth does not search after the mixture that is to kill it, but the mixture must be placed where that insect or fungus has taken up its abode; also, spraying should never be done in wet weather, as the rain washes the mixture off the tree before it can do much good.

The strength of such applications as Bordeaux mixture, kerosene emulsion, &c., must be regulated by the season and the resisting power of the plant sprayed, for plants should not be injured when remedies are applied.

Bluestone may be used in strong solution in winter when the leaves are off the tree, but even a weak solution in spring will sometimes destroy the leaves.

In spraying, the following precautions must be observed:—

1. All substances used for spray mixtures should be properly labelled and kept in places by themselves.

2. Solutions containing copper sulphate, arsenite of lead, or any corrosive material should be made in wooden or earthenware vessels.

3. Arsenical sprays should not be applied to fruits within a few weeks of their being picked.

The following list may be of convenience to fruitgrowers, giving, as it does, a summary of the different pests and diseases, with the remedies to be applied:—

THE RED SCALE OF ORANGE (*Aspidrotus coccineus*).—Introduced pest. This is an oyster scale. Eggs laid in summer and hatch the following spring. Females are viviparous (produce young alive), and are wingless. Winter passed in old scale. Spray in late winter with kerosene emulsion or resin compound. Scale attacks fruit shoots and leaves of tree.

THE COMMON BLACK SCALE (*Lecanium olea*).—Attacks most of our fruit trees, but principally citrus. Spray with kerosene emulsion.

THE COTTONY-CUSHION SCALE (*Aspidrotus perniciosus*).—Native pest of the wattles. Attacks branches and twigs of citrus. Young hatched in spring (August and September). Three or four broods in one year. Spray in spring and summer with kerosene emulsion (1 part to 15 of water). In South Africa, deciduous fruit trees are attacked as well as citrus. Eggs of last brood remain till next spring.

PEARS

PEAR MITE (*Phytophytus pyri*).—Introduced pest. Attacks leaves of pear trees, causing unsightly galls, also injuring the leaves. Hibernate during winter in leaf buds and under bark of last year's shoots. When spraying for this pest, the mixture should be projected upwards, as the galls containing the insects are on the underside of the leaves. The mite lives inside tissue of leaf. It spreads principally in spring, and this is the only time when it can be dealt with. During September, spray three or four times (a week apart) with weak kerosene emulsion.

THE PEAR AND CHERRY SLUG (*Selandria cerasi*).—Introduced pest. Attacks pear, quince, cherry, and plum trees. This pest is the larvæ of a saw-fly, and attacks the leaves of the trees, gnawing off the upper surface of the leaf, thereby causing great damage. The trees should be treated before the fruit is far advanced, and while the tree is not in flower. Spray with kerosene emulsion or with hellebore (1 lb. to 40 gallons of water) when the fruit is off the tree.

PLUMS.

THE PLUM APHIS.—Habits similar to peach aphid. In early spring, before buds burst, lay roots bare and spray with kerosene emulsion. After pruning, spray head of tree with kerosene emulsion or resin compound.

CHERRIES.

THE CHERRY GREEN BEETLE (*Diphucephala colaspidoides*).—Native pest. Damage done by perfect insect. Eggs supposed to be laid just beneath the surface of the soil or about the roots of native trees. Perfect insect appears about "cherry time" (November). Attacks all fruit trees. Spray when not in fruit with Paris green.

THE RUTHERGLEN FLY PEST.—Thought to be a native pest. Mature insect does damage by perforating the fruit. Four broods in a year. Attacks all fruits (especially soft fruits) as they are ripening. Keep all weeds, rubbish, &c., down. Spray with a volatile spray (1 pint of benzole to 20 gallons of water).

THE COMMON VICTORIAN LOCUST (*Pachytelus australis*).—The locust is a world-wide pest, and attacks all plants, trees, &c. The eggs hatch in early summer, and are laid by female on slopes almost free from vegetation. If spraying with Paris green, in combination with such remedies as "locust fungus," poisoned bait, &c., is carried out, this pest should not make much headway.

PEACHES.

THE BLACK PEACH APHIS (*Myzus cerasi*).—Introduced pest. Attacks shoots of peach, apricot, plum, and cherry in spring and early summer. Winter passed on roots of tree. Disappear from head of tree when hot winds set in. Spray with kerosene emulsion (lukewarm when in leaf, but it can be sprayed on hot—130 degrees Fahr.—when tree is dormant, 1 part to 15 of water), resin compound, tobacco water and soft soap, or sulphate of potassium.

THE GREEN PEACH APHIS.—Attacks trees when in leaf. Habits similar to black peach aphid. When aphid leave head of tree they congregate around base of roots. Spray when trees have shed their leaves, and again just after swelling of the buds. Remedies similar to black peach aphid.

VINES.

THE VINE MOTH (*Agarista glysine*).—Native pest. Eggs deposited on vine leaves, stalks, &c. Two or three broods in a year. Larvæ strip leaves, starting from the outside and eating towards mid-rib. They sometimes attack young shoots. Spraying with Paris green (1 lb. to 200 gallons of water), treacle 1 lb., should keep this pest in check.

CITRUS.

THE CASE MOTH OF THE ORANGE (*Metura elongata*).—Attacks fruit trees, eating off the leaves. Young hatch in autumn and spring. Mature female is legless and wingless, and lays its eggs in bottom of case. Spray with Paris green (1 lb. to 180 or 200 gallons of water). Damage done by larvæ.

THE SAN JOSE SCALE (*Aspidiotus perniciosus*).—Introduced pest. Attacks all fruit trees, usually the growing shoots. Attacks peaches, apples, apricots, and pears principally. Adult females are viviparous (produce young alive) during spring and summer. Hybernate during winter under old bark, in crevices, &c. In spring, young insects spread from old branches on to young shoots and fruit. When pruning (if the season is favourable) cut away as much diseased wood as possible, and spray with kerosene emulsion (full strength), and in summer with kerosene emulsion (half strength) or resin compound. This scale has proved a terrible pest in America, and if not checked may repeat itself here. It is supposed to be the worst of all scales.

THE LIGHT-BROWN APPLE MOTH (*Cacaecia responsana*).—Supposed to have made its appearance from native trees. Habits similar to codlin moth, and it tunnels into fruit, causing premature ripening. Spray two or three times with

Paris green (1 lb. to 180 to 200 gallons of water) when the fruit is setting. Bandaging as for codlin moth also recommended.

THE PAINTED APPLE MOTH (*Teia anartoides*).—Native pest of the wattle. Attacks leaves of fruit trees, principally apples. Can be prevented from attacking trees by a spraying with kerosene emulsion. To kill grubs outright, a spraying with 1 lb. Paris green to 180 to 200 gallons of water.—“Fruit World.”

PLUMS AND PEACHES.

(By F. A. WAUGH and G. O. GREENE, Massachusetts.)

Reports are here given on plums and the pruning of peach trees.

The report on plums deals principally with the behaviour of a large number of varieties grown at the station. Bradshaw has proved one of the best of the Domesticas grown, while Burbank, of the Japanese sorts, has proved the most profitable and productive market plum at the station.

Experiments were made in marketing plums in 3-lb. baskets, such as are used for grapes. This proved a satisfactory package, as it furnished about the quantity of fruit desired by most purchasers.

Plums for canning were packed in Jersey peach baskets holding 16 quarts; this proved satisfactory, cheap, and convenient. Most markets were found not to be fastidious with respect to the form of the packages used for plums, and any small meat basket or box will answer if the fruit is of good quality and well packed.

In pruning experiments with peaches, one row has been left for nine years without pruning. These trees are quite open-headed, and have generally assumed a vase form. The lower part of the main branches is bare, and the fruiting wood is sparse, weak, and high up in the trees. The trees are much less thrifty and vigorous than pruned trees of the same variety. As a result of this lack of vigour, a number of trees succumbed to the cold during the preceding winter.

A row of trees next to this has been headed back moderately two or three times, as a result of which they are thick topped, with a good deal of feeble, sappy growth on the inside. The annual growth, however, has been much more vigorous, and the health of the trees better than those not pruned. More and stronger fruit buds have also formed. The main fruit branches are shorter and stronger, and more capable of sustaining a large crop of fruit. The experiment is believed to show conclusively that the best form of peach-tree cannot be secured and maintained without pruning.

During the past three years a special experiment has been made in heading back peach trees in the spring. The conclusion reached relative to this system is that “the heading back of peach trees in early spring is good practice, and in all cases advisable; in this pruning from one-third to two-thirds of the wood of the previous year should be removed,” depending upon the number of living fruit buds on the one-year-old wood. When from any cause there are no fruit buds, advantage should be taken to cut back with comparative severity. Only in extraordinary instances should the cutting extend back into two or three year old branches.

Some experiments were made in summer pruning peach trees. With early spring pruning it had been noticed that many feeble and useless shoots grew in the centre of the tree. It was thought that if a considerable quantity of the new leafy shoots on the outside of the tree were removed, thus admitting a reasonable amount of light to the inside of the tree top, some benefit might result.

“In no case were the results of this treatment convincing. The formation of strong shoots with fruit buds on the interior branches was never visibly promoted. The outside branches which were allowed to remain seemed to profit

somewhat by the removal of their crowding neighbours, and this was apparently the chief benefit derived from the experiment. On the whole, it does not seem to us that this practice is to be greatly recommended."

Cutting back the young growth of the outside branches to correct overgrowth did not give satisfactory results. The stopping of the growing shoots was usually followed by the pushing out of side buds and shoots lower down, which were nearly always too weak to set good fruit buds.

Considerable winter injury was sustained by peach trees in both 1903-4. The damage was not serious in 1903, but in 1904 the trees were seriously weakened by freezing, and some were killed outright. In treating the injured trees one block was left entirely without pruning, another was pruned in mid-summer after the trees had started, a third was cut back from two-thirds to three-fourths of the previous year's growth, and a fourth was headed back near to the trunk, only the stubs of the main branches being left. The following table shows the results:—

EFFECT OF DIFFERENT METHODS OF PRUNING FROM PEACH TREES.

Method of Pruning.	Total Number Pruned.	Living, Autumn of 1904.	Dead, Autumn of 1904.	Living.
Trees unpruned	121	113.0	8.0	93
Moderately cut back	48	47.5	.5	99
Severely cut back	68	55.0	13.0	81
Cut back to stubs	46	24.0	22.0	52

While a large number of the unpruned trees lived, the growth made by the headed-in trees which lived was much better than that made by the unpruned trees. It was the judgment of many who saw the trees that the ones moderately cut back showed the best growth and were in the best condition. The experiment is also believed to point out that trees seriously weakened by freezing should not be cut back close to the main trunks.

GIVING MEDICINE TO HORSES.

The practice of giving medicine to horses by elevating the head and pouring it into the nostrils is a foolish method. Providing the medicine is of a non-irritating character, so as not to inflame the membrane of the nasal chambers, and providing, again, that the pouring is done through the left nostril, and again providing that the head is not elevated too high, so as thoroughly to open the epiglottis, then the liquid will go direct through the œsophagus (gullet) to the stomach. But when the remedy is a fiery liquid, like ginger or pepper tea, then the sensitive membrane of the nasal chamber is more or less irritated by the dose, and serious harm may follow. Should anyone administer medicine through the right nostril, there is always great danger of the horse being strangled, as the liquid arrives in the pharynx, and, as the horse does not swallow naturally, strangulation may follow when he breathes. The left nostril is in a line with the œsophagus (gullet), and when the head is elevated just at the right angle the liquid will run down all right. But raise the head too high, and the valve (epiglottis) that closes the end of the windpipe will be lifted, and the liquid will as readily run down the windpipe as the gullet. The practice is dangerous, and, what is more, is unnecessary. With a drenching bit or with even a common two-tined pitchfork, an assistant can easily elevate the head of any horse sufficiently to pour medicine from a bottle down his throat easily. Let fools practise fool methods, and wise people strive to practise common-sense methods in administering medicine to animals.—"Exchange."

Botany.

CONTRIBUTIONS TO THE FLORA OF QUEENSLAND.

By F. MANSON BAILEY, F.L.S., Colonial Botanist.

Order MENISPERMACEÆ.

TINOSPORA, Miers.

T. Berneyi, *Bail.* Queensl. Agri. Journ., Vol. XVIII., 76. "Croydon Ivy." An extensive climber with yam-like rhizomes. Stems cylindrical, 2 to 3 in. diameter, smooth, glabrous, or somewhat hoary when young, more or less marked by lenticels; when the main stems have been cut through, and thus the plant's connection with the ground is severed, the upper portion of the plant, by adventitious roots from its base, frequently renews the connection with the soil, a feature known to be performed by another species in Malabar. Leaves thin, glabrous, on strong-growing shoots on the lower parts of the plant, cordate, $3\frac{1}{2}$ in. long by $4\frac{1}{2}$ in. broad, 5-nerved at the base, and closely reticulate; petioles slender, about $1\frac{1}{2}$ in. long; leaves on the terminal or more slender branchlets, lanceolate, cuneate at the base, 1 to 2 in. long and $\frac{1}{2}$ -inch broad, thin, glabrous, 3-nerved at the base, petioles slender, 1 in. long. Racemes female, $1\frac{1}{2}$ to $4\frac{1}{2}$ in. long, flowers numerous; bracts narrow-lanceolate not 1 line long, pedicels about 1 line long. Outer segments of flowers about $1\frac{1}{2}$ line long, broadly-ovate, and appear to be yellowish, the inner ones much smaller. Carpels 3 or more. Drupes red, oblong, about 4 lines long, on thick fleshy pedicels of about $1\frac{1}{2}$ line.

As I have received more complete specimens, the above should be substituted for the previous notices of the plant.

Hab. : Spring Valley, Hughenden, *F. L. Berney*; Croydon, *J. A. C. Wilson*, who says that the plant is deciduous.

Order ONAGRARIÆ.

ÆNOTHERA, Linn.

Æ. sinuata, *Linn.*, *forma*. A softly pubescent prostrate or decumbent plant. Leaves oblong-apiculate, and more or less lobed in the lower half, upper ones sessile, lower ones petiolate, 1 to 3 in. long. Flowers sessile in the upper axils, ovary about 1 in. long. Calyx tube slender, exceeding 1 in.; lobes rather shorter, narrow. Petals obcordate, about as long as the calyx lobes, yellow, more or less stained a reddish-purple in the centre. Stamens rather shorter than the corolla. Capsule $1\frac{1}{2}$ in. long, slightly curved, obtusely 4-angled.

Hab. : A naturalised plant from America, now forming large patches on the sandy beach at Redcliffe. Patches often may be met with on these sands; also, of *Æ. longiflora*, another naturalised species of the genus. Both are showy plants, and have escaped, probably, from garden culture.

Order CUCURBITACEÆ.

CUCUMIS, Linn.

C. myriocarpus, *Naud.* Gooseberry Cucumber. Plant annual, green, scabrous, branches angular-striate. Leaves $1\frac{1}{2}$ to 2 in. long and wide, upper ones much smaller, base cordate, margins denticulate, palmately 3 to 7 lobed; petioles hispid, usually rather long. Peduncles much shorter than the petioles. Tendrils slender, short, angular. Male flowers solitary or fasciculate, calyx tube narrow campanulate, teeth subulate. Corolla with ovate-acute segments.

Stamens glabrous, filaments filiform, anthers oblong, subglabrous. Female flowers solitary, peduncles of fruit subfiliform. Fruit numerous, round, about 1 in. diameter, densely or sparingly beset with weak bristle-like spines; seeds ovate-oblong.

Hab. : South Africa; has become naturalised in the South-western districts of Queensland, and supposed to be injurious to horses.—*Inspr. B. F. Wood.*

Order FILICES.

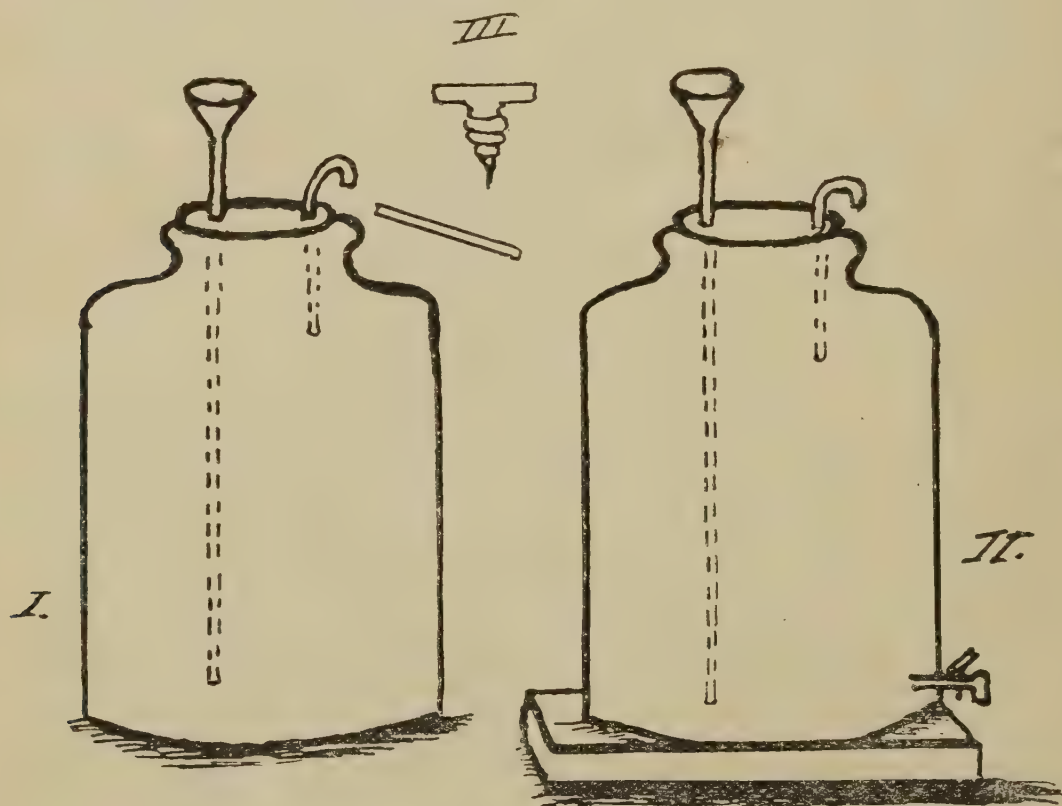
ASPIDIUM, Swartz.

A. molle, Swartz, forma Keffordii. This plant differs from other Australian forms of the species in that the apex of the fronds and most of the leaflets are much divided into pretty tassels, the fronds are also of a deep glossy green, and the rhachis purplish.

It was met with by Mr. W. R. Kefford on his recent visit to the Johnstone River, and is well worthy of garden culture.

HOW TO MAKE OLIVE OIL FOR DOMESTIC USE.

To try the quantity and quality of the oil of different sorts of olives (or to make small quantities of oil), take an earthen jar and bung with a water-funnel and a discharge pipe (which can be made with pieces of small gas piping). The bung can be made airtight by putting round it a washer of leather or gutta-percha, and a tapered screw in the middle to screw down when the bung is fitted in the jar. Put 100 lb. of crushed olives in the jar, bung tight, let stand a while, then pour water down the funnel, and the oil will be forced up through the discharge pipe.



The fruit can be crushed with a strong hand sausage machine. A piece of sponge for strainer under the discharge pipe will prevent it getting clogged, and will filter the oil clear.

For Virgin oil the olives should be ground immediately on gathering, and the oil run on to cold water. For a dark fatty oil they should be dead ripe, and allowed to dry a little—spread out, but not heaped, or they will ferment, get mouldy, and make only rank oil.

For common oil mix hot water with the pulp.—“Garden and Field.”

Horticulture

FLOWER GARDENING.—No. 4.

By THE EDITOR.

PLANTS SUITABLE FOR OUT-DOOR CULTURE.

GERANIUMS AND PELARGONIUMS.

Few florists, professional or amateur, trouble themselves to give any directions for the growing of geraniums; consequently, I have to go back as far as 1875 to find anything about these flowers, and in that year Mr. A. J. Hockings, who, in the early days, was the premier florist in Queensland, and whose son still keeps up the prestige gained by his father, published a little book entitled "The Flower Garden in Queensland," the instructions in which, for the management of a flower garden, are as valuable to-day as they were in the seventies. In this book we find the following notes on the cultivation of the geranium:—

"The geranium will grow under such unfavourable circumstances that it may appear superfluous to give directions for its cultivation; but it is so seldom that a well-grown specimen is to be seen, and some of the fancy and show varieties (pelargoniums) would so well repay the trouble, that it has been thought desirable to do so."

In W. Adamson's "Australian Gardener" (Melbourne), also I find instructions for the growing of pelargoniums.

Mr. Hockings wrote:—"The soil for geraniums is of the utmost importance. It must be sandy and free in the open border, and ample drainage must be provided for such as are grown in pots. A compost, in which almost any plant may be grown to perfection, formed of well-rotted turves, cow dung, and peat, with the addition of silver sand, would grow them well. Some growers mix a quantity of broken brick, about the size of peas, in the potting earth. If the soil be too rich, a long-jointed luxuriant growth is induced, which gives the plants a straggling appearance, whereas a sturdy, short-jointed growth should be aimed at, with rich, well-developed foliage and bloom."

PLANTS FOR SHOW.

When the trusses of bloom are formed, it will generally be desirable to apply liquid cow dung to these—1 quart of cow dung mixed with 6 quarts of water—and, when settled, let the soil be watered with the liquid every fourth day until they bloom, pure water being used on other occasions.

GARDEN CULTURE.

Some of the most healthy of the fancy and show geraniums to be seen in the vicinity of Brisbane are grown in the open crumbling soil, largely mixed with gravel, which is on the neighbouring ridges. Thorough drainage is, in fact, the chief requisite in the successful cultivation of these old favourites.

PROPAGATION.

The zonal varieties strike from cuttings with such facility that no instructions are necessary. The fancy and show varieties, generally called pelargoniums, are, however, not so tractable. Cuttings of these should be taken in July, when they first start into spring growth. The extreme ends of the new shoots are taken, about 3 inches in length, cut clean, just under a joint. Remove the lower leaf with a sharp knife, and dibble the cuttings in rows in an open sandy or gravelly soil, in a shady border. Some of the best sorts, which it is almost impossible to grow from cuttings from the head, may be

increased by cuttings from the root which have a few fibres attached. All of them may be propagated by layering during the early summer months, just as the green stems are assuming a mottled brown appearance, showing that they are getting ripe. At this stage of their growth they root very freely in suitable soil. The ivy-leaf geranium belongs to the pelargoniums.

PELARGONIUMS.

"These," says Mr. Adamson, "are amongst the most popular plants of the day; they are equally suitable for pot or open ground culture. The same treatment will suit both show and fancy varieties, except that the fancies being more delicate must have a lighter soil. Cuttings may be put in when the plants are cut down after blooming, either in pots, boxes, or the open soil, in a frame with a movable shade. Cuttings of the young shoots taken in spring, and placed in the heat also strike freely. As soon as rooted they should be potted singly into small pots, and, when established, the points must be pinched out, and the same with the side shoots as they grow, so that bushy plants may be formed. The first year they should be shifted whenever the roots have begun to spread around the sides of the pots, in order to grow them as large as possible until the flower buds appear. When flowering is over, the pots should be plunged in the soil in an easterly aspect, where they will get the morning sun to ripen the wood; when the shoots have become moderately hard, they must be cut back to such an extent that bare stems will not be seen when the plant is again in growth. When the buds have broken and the young shoots have grown about an inch, the plants must be taken out of the pots, shaken out of the old soil, and repotted in pots of as small a size as will accommodate the roots; set in a close frame until re-established, then gradually inured to the open air, but not exposed to violent rains, and return to the greenhouse any time in March. The young shoots must be tied out as they advance, and may be stopped when they have made 3 inches of growth; and, after they have broken again, the plants should be shifted into their blooming pots—the earliest in April or May and the latest in July or the beginning of August. They must be kept near the glass, have abundant ventilation, be allowed plenty of room on all sides, and be fumigated every third week. A lean-to house is the most suitable, with a stage, on which they can be raised or lowered as necessary, so as to keep them near the glass."

I must here point out that the above directions apply more to a climate which, like that of Victoria, is liable to sudden changes, and where the winters are severe. In Queensland, geraniums and their congeners may be grown all the year round in the open, provided they are not exposed to strong westerly winds.

"The soil should be composed of half loam and half peat and manure, with sufficient sand to keep it open. As plants of the zonal section flower almost continuously, they may be cut back either in autumn or spring, and potted progressively as required. They may be placed in a warm temperature in spring if wanted to flower early. During summer they may be fully exposed out of doors, with their pots plunged in the soil. The young shoots may be stopped at any time. If required for decoration in winter, flowering should be prevented during the summer season. Tricolours colour better if placed where they can be in shade at mid-day."

SOME GOOD VARIETIES TO PLANT.

Single Zonal Pelargoniums.—Aurora Boreale, Cremorne Scarlet, Charles French, Dryden, Dr. Nansen (pure white), Miss Fenn, Shelly, &c.

Double Pelargoniums.—Dr. Depar, Golden Gate, F. V. Raspail Improved (the best double scarlet in cultivation), Mrs. W. E. Galdstone (pure white, shaded flesh-pink in the centre), White Abbey, Yarrner Robinson, Madame Charlotte (semi-double).

The Regals at their best are splendid flowering plants, but are not often seen to advantage in the open garden. The trusses and individual flowers are larger than the show kinds, and the petals are frilled and of much greater substance. Fancy, or "ladies," pelargoniums are a smaller-growing type, producing neat trusses of bloom. They were very popular at one time, but are now rarely seen, except in nursery collections. A much more generally grown class are ivy-leaved or climbing varieties, some of which are among the most effective and rapid-growing of climbing plants. These are specially useful for covering unsightly places in the garden, but one drawback to their general value is their liability to become a harbour for snails.

DAHLIAS.

The dahlia is so easily grown in the genial Queensland climate that it seems superfluous to give any other advice about them beyond recommending the novice to the most reliable nurseryman. Still, a few remarks will not be out of place.

The plants may be raised from seed, from tubers, or from cuttings, the latter being the best plan for the amateur who wants to get flowers with as little delay as possible. The soil for the dahlia should be a rich, deep, friable loam, which should be trenched to a depth of at least 18 inches, and, if the soil is not naturally rich, a spadeful of well-rotted dung should be added where each root is to be planted. The tubers should be placed about 4 to 6 feet apart, and one or more stakes should be driven into the ground, ready for the support of the future plant. As the latter advances in growth, it should be carefully tied to the stake, as the brittle stems are very liable to be torn off during high winds. In order to produce fine blooms, all weak side shoots and superfluous suckers must be removed. As the best flowers are produced at the end of the summer, after the extreme heat has passed, a portion of the plants should be kept back until the beginning of December. The tubers may be planted for a succession of bloom, from the beginning of August to the end of October, at about 3 inches under the surface of the soil.

As soon as the plants are past their beauty and cease to produce good blooms, pass a fork or spade gently under each root, and slightly lift them. The stems will then wither, and in a week the tubers will be ripe and ready to take up and store away in some dry shady place to await the next planting season. The easiest and best way to increase dahlias is, as I have already said, to plant the tubers. These may be divided, as is done with the potato. Every eye or bud with a small portion of the bulb attached will produce a plant. Cuttings of the stems will also root freely and make good plants if they are taken as soon as they are $1\frac{1}{2}$ inch long.

Single-flowered dahlias are well adapted to flower borders, where they make a fine show, flowering through the summer season. The double-flowered varieties produce the best effect when planted in large groups. The cactus dahlias are also well adapted to being planted at the back of flower borders or in groups. The Collarette is a very pretty single dahlia, possessing around its disk a series of florets, producing a highly ornamental effect. The single and double cactus, the Pompom, the single Tom Thumb (a new dwarf), and the giant single Perfection are amongst the best.

CARNATIONS AND PICOTEES.

Next to the queen of flowers—the rose—the carnation, owing to its beauty and delicious fragrance, takes a high place in the estimation of all horticulturists. The charm of their form, the variety and disposition of their colour, unite with their fragrance to render them unsurpassable by any other flower. In the temperate districts of Queensland they may be grown with much success in the open border and even in some of the warmer portions of the State if a little regard be paid to aspect and shade.

The carnation has one advantage over the rose in that it will flourish in positions where the rose would make a complete failure. In smoky districts that would be death to the rose, the carnation would be in its element. Carnations are usually divided into four classes, as follow:—Selfs, Bizarres, Flakes, and Picotees. Selfs are of one colour only, without marks or shadings; Bizarres are those in which the white ground colour is striped with two colours, one being darker than the other; Flakes are those in which the ground colour of the petals is striped with only one colour—purple, scarlet, or rose.

The properties of form in the picotee are similar to those of the carnation, but the distinction between carnation and picotee is that the colour of the former is disposed in unequal stripes, going from the centre to the outer edges, and that of the picotees is disposed on the outer edges of the petals and radiates inwards, and the more uniformly this is disposed the better.

The ground colour of the picotee should be white or yellow, pure, and without blemish. In some instances the more delicate-edged picotees appear to be of less robust character than carnations generally, and it is probable that a considerable amount of breeding in-and-in to secure the fine beaded edge may have induced constitutional weakness. It may be fittingly described as the feminine of the more muscular carnation. The picotees are divided into three sections—red edged, purple edged, and rose edged. Although the picotees are often classed separate from carnations, they both require the same treatment, and both may be raised from one pod of seed.

CULTIVATION.

The carnation is one of the easiest cultivated of plants, and will lend itself to the various forms of garden ornamentation. It can be grown in the mixed borders, on single lines, or, better still, in beds by themselves. The first consideration is the preparation of the beds, which, for several reasons, should be undertaken some time beforehand, in order that the ground may have time to settle before the plants are put in, as a firm root run is one of the first principles of successful carnation culture. Time and a good soaking rain will bring this about more effectually than treading. Stiff or clay soils do not require compressing as lighter formations, but in loose soil plants will not thrive to any extent or for any length of time. Planting may commence in autumn, through the winter, and early spring, but the best time is early autumn, and on no account should the plant be pot bound, but just started to grow in the pot and transferred to its blooming quarters. Carnations are never satisfactory if once pot bound. A piece of ground in an open and sunny position, yet sheltered from strong winds, should be chosen, if possible. The ground should be deeply dug—a good double digging—that is, two spits deep—if the ground is old garden soil, and a thick coat of well-rotted cow manure well mixed with the soil. Do not fall into the error of making the ground too rich with manure. This would have a worse result than the other extreme of poverty. Extra nourishment can always be supplied later, with the best results, by means of artificial manure or mulching and liquid manure in dry times.

Heavy soils will be greatly benefited by the addition of sand or grit—sea sand is excellent, as it contains a small percentage of salt. Burnt soil is also good. Carnations make quick and strong growth in charred earth. If the soil be a very light one, it will be specially benefited by a dressing of burned garden refuse. Carnations are also very fond of lime or old mortar, but it must not be overdone. Bonedust and superphosphate are the best fertilisers, dusted over the ground at the rate of 3 lb. per square rod. Soot is cheap, and an excellent fertiliser.

The beds should be 4 feet wide, raised fully 6 inches higher than the path; these beds will hold three rows of plants, 15 inches apart. One of the secrets of successful culture is firm planting, spreading the roots out neatly (that is, if the plants are not in pots). Press the soil firmly down well around the

plants. The roots should be well covered with soil, but at the same time do not bury the plants in a hole, rather let their foliage stand clear of the surrounding soil. If in damp ground, let each plant stand on a slight mound, and receive a good watering to settle the soil around it. If from pots, plant the same depth as the pot they were in. If in heavy soil, some light material may with advantage be placed around before the heavy soil is filled in.

The after cultivation consists principally in keeping the ground free from weeds, giving water in dry times (though none will be required during winter), supporting the flower stems as they rise, thinning the buds more or less, and destroying earwigs and other pests.

Top dressing is a valuable aid to the cultivator, especially where the soil is shallow, sandy, or impoverished, or when the plants make poor growth. The best time to apply it is when the shoots start to rise in spring and before the buds show. A good top dressing consists of leaf mould, old hot-bed manure, some sifted mortar rubbish, with a good sprinkling of soot and bonedust, mixed well together and spread over the bed to a depth of 2 inches, working it around and between the plants. Water this well in, and the result will soon be apparent, for the roots will begin to work, and soon improve the appearance of the plants. As the flower stems rise in the spring they should be supported, as in the early stages of growth they are very brittle and easily broken by wind. Laths used by plasterers are cheap and suitable. One-year-old plants are best supported by each shoot being tied out to a lath; older plants would need four laths placed in a square with reaper twine wound in the shape of hoops. This, I find, gives the plant a good support and a graceful appearance. Nothing looks worse than slovenly tied-up carnation plants. As the buds show form, if good flowers are required, they must be thinned. For ordinary purposes little or no thinning is required, but for show purposes not more than two buds should be left on a strong shoot, or one on a weak one. After the plant has done blooming, the flower stems should be cut right down to their base.

PIPINGs OR CUTTINGS.

These are made as short as possible, but there should be a stem with three joints to insert in the soil. The bottom leaves should be carefully removed and the stem cut clean off under the last joint. Give the soil a good watering with a fine-rose watering-pot, so as not to disturb the surface. Thrust the pipings in to the depth of the stem, but do not shorten the top leaves, as some recommend. When the pots are filled, at about 2 inches apart, water sufficiently to settle the soil, and shade from the sun until they have struck root. Water occasionally as required, but not too copiously, or they will "damp off." When rooted, prepare a bed and plant them out 6 inches apart. From this bed all the intermediate plants may be withdrawn as required.

LAYERS.

The following instructions, by Glenny, are taken from the late Mr. A. J. Hockings' "The Flower Garden in Queensland":—

"Cut off the leaves pretty close from all but the top three joints; then make an incision in the stem, on the under side, half-way between the second and third joints, under the lower leaves left on, and to nearly the middle of the stem, bearing the knife upwards, right through the second joint, and cut off at the joint the sloping piece below it. The place to peg it down on must be dug up or loosened with the knife, and a little sand should be mixed among it. Then, with a peg, made like a little hooked walking stick, 4 inches long, peg down the layer, so that the whole of the slit part is below the surface. Finally, water, to settle the earth about them."

In the warmer parts of Queensland the slit part should be 2 inches under the soil, or the surface should be well mulched. Before making layers it is desirable, whether in pots or in the open border, to stir the soil and mix a

good compost dressing of half road sand and half leaf mould, or dung rotted into mould. The layers will root in the pots in a month or six weeks, but should be left attached to the plant until they have plenty of fibre, and, when thoroughly rooted, they may be cut off and potted, two in a 4 or 5 inch pot, in soil from rotted turves, but no dung, and plenty of crocks for drainage.

SOME GOOD VARIETIES.

The following is a list of a few of our best Queensland-raised varieties:—Delicator, Tiger, Robert Ward (stripes); Victor, Nigger, Hindoo Improved (dark); Variables (peach); Sunrise (bright red); Bailey's White (white); President Kruger (red); Mrs. Proudfoot (improved); White Clipper (white); Purity (white). The yellow bloom, well known in England, is, I believe, not grown in Queensland, but if any amateur could succeed in producing a really good yellow bloom there would be a great many inquiries for it, that colour being very rare in the State.

A VALUABLE CARNATION.

About two years ago a seedling of a new variety of carnation, which has been named *The Aristocrat*, was raised by a florist at Cincinnati, U.S.A., who sold it for £8,000. This exceeds the previous highest price given for a new variety of this flower by £2,000. It would appear incredible that such an enormous sum should be given for one plant, but it must be remembered that there are tens of thousands of wealthy and well-to-do amateur horticulturists in the United States as well as in Europe and other parts of the world, not to speak of the great army of professional gardeners, who would willingly pay from 5s. to £1 per plant for a really good new flower. Not so long ago new varieties of potatoes sold at from £3,000 to £300,000 per ton, whilst £50 was offered for a single tuber.

RAISING PLANTS FROM SEED.

By G. WILLIAMS.

The following interesting paper, as reported in the "Rockhampton Bulletin," on the above subject was read by Mr. G. Williams, at the March meeting of the Central Queensland Horticultural Society, at Rockhampton:—

"The propagation of plants by seeds is the most natural mode, and is generally considered the most satisfactory, excepting where the exact counterpart of a plant is desired. With some plants, more particularly amongst those of a ligneous nature, and which have been improved by cultivation and selection, the tendency amongst seedlings is frequently to revert to the original. Though an occasional further improvement may be noted or brought about artificially, this is exceptional. Consequently, other means are employed to propagate and diffuse such varieties with their true characteristics.

"In connection with the raising of plants from seeds, the essentials of success are, briefly, that the seeds have been properly ripened and properly kept till the period of sowing, and that they be sown in a proper manner under favourable circumstances. As to perfection and maturity, this is a matter over which the planter has usually but little control, being mainly dependent on the agency of others to procure his supplies. Consequently, the seedsman gets quite a full share of the blame for non-germination. The fertility, particularly of small seeds, cannot well be determined without the aid of a microscope. Simple tests have been recommended; but their application can only be reliable in the case of large seeds, and it is usually to those of small size that the horticulturist is indebted for failures. The length of time which vitality remains unimpaired must be considered in respect of perfection, for whilst in some it may be almost indefinite, in others it is very brief. With herbaceous plants the period is more or less extended, though frequently does not amount to two years.

"The time when seeds are self-sown is frequently quoted as being the most suitable for propagating the species with the greatest degree of certainty in the absence of cultivation; but this is hardly likely to commend itself for general application, particularly amongst annuals and perennials, if for no other reason than the attendant inconvenience consequent upon the space of time which would frequently elapse before germination. With trees and shrubs the keeping qualities of seeds vary considerably, and these, being cultivated with a different object to plants of herbaceous nature, should, as a general rule, be planted at the earliest opportunity after ripening. Those of many of our cultivated fruits will not remain fertile for any length of time, and commence to germinate almost immediately after, and, in some cases, previous to planting. The germination of others, though possessing keeping qualities, is greatly accelerated by immediate planting. The conditions under which seeds are stored must affect their vitality, as the external agents essential to vegetation are water, heat, and air.

"The principle of seed-sowing is never to bury the seeds deeper than is indispensable to the preservation of moisture around them, and it is generally accepted that they should be planted beneath the surface about the same depth as the extent of their own diameter, and those of a very delicate nature immediately on the surface, provision being made for the supply of the necessary moisture by capillary attraction. The covering with earth is to be regarded mainly as a method of preserving around them the necessary moisture rather than, as frequently supposed, as a means of guarding them from light, for, if deposited on a damp soil and covered with a plate of glass closely pressed down upon them, they will germinate as well as if in darkness. Seeing that the preservation of moisture (which, except in rare instances, must not be excessive) is one of the main factors in stimulating germination, it is indispensable that the top soil at least is of a constituency best calculated to maintain a moist but not sodden condition. Fine, light, and rich soil, or a compost containing peat and leaf-mould, is considered most favourable to the growth of nearly all seeds, though it is advisable, particularly where it is proposed to transplant the seedlings, that the fertility be not too intense, or an over-luxuriant growth, and consequently instability, will result.

"Though seeds will germinate with due supplies of heat and moisture, a fertile soil is essential to further progress, and it is found from experience that seeds of some plants do not vegetate in a strong loam, though the plants afterwards flourish in soil of that description. Experiments have been made on the vegetation and growth of plants in pure earths, and also in these with the aids of stimulants and manures. It might have been supposed that the pure earths, with the addition of artificial manures, would have answered as well as a compost of peat and loam, but the result proved quite the contrary. A moderately fertile and open soil will give best results, and tend to sturdy growth and general fitness of the young plants to withstand transplanting, though the effects of light and watering must be considered in this connection.

"For starting annuals and perennials for transplanting, except those of a very delicate nature (where pots or seed pans had, perhaps, better be employed), shallow boxes, with a suitable shade or covering to prevent damage by heavy rains, and also as a protection against the sun's rays, are satisfactorily utilised. There is some diversity of opinion as to whether seeds should be planted in a damp soil, a comparatively dry soil and watered immediately after planting, or allowed to absorb moisture from the surrounding soil for a varying time, according to the nature of the seeds, before watering. With such as are under close supervision this would not appear to be of much importance. With field crops, more particularly those bearing small seeds, planting in comparatively dry ground has its advantages, for the seed has, under ordinary circumstances, filled out through the agency of moisture by absorption, and bursts almost immediately on the application of greater supply, the young root,

or radicle, being pushed downward to a sufficient depth to maintain that necessary for future development. If planted in moist soil shortly after rain, germination is stimulated, but slower in action, and, in the absence of further rain, the drying of the surface soil may be so rapid that the young plants perish through the inability of the radicle to penetrate the soil to a sufficient depth in time to meet the requirements.

"The effects of light and shade are very pronounced on young plants. Just how much shade is required can only be gauged by observation and experience. The effects of the direct sun's rays on those of a delicate nature would be disastrous, whilst the absence of sufficient light would cause a weak and drawn growth. Overwatering may also have a tendency in the same direction, and before transplanting increased light and less water will tend to harden the young plants, that they may be better able to withstand the shock.

"Insect pests are frequently troublesome at this time of the year, destroying the young plants indiscriminately. Those which inhabit the soil of pots, &c., may be displaced or destroyed by hot water, which, though death to all insects at a temperature of 120 degrees to 125 degrees, does not appear to injure plants. Its application to foliage is unsatisfactory owing to the difficulty of maintaining the temperature, which immediately drops when a spray is made. The vegetable-grower finds his investments in seeds of the Brassica family a dead loss owing to the persistency of small caterpillars that apparently await the appearance of the young plants above ground, and attempts to destroy the pest with insecticides usually result in the destruction of the plant also. Caterpillars which attack plants in this manner are the larvæ of small moths, which are seldom seen in the daytime, and, consequently, escape the blame to which they are entitled. A simple and effective barrier against their inroads may be made by covering a small frame—either for boxes or open ground—with mosquito net, and keeping the plant under cover until they are large enough to transplant, when the liability to damage from the same source will be greatly minimised. The presence of an injurious fungus amongst young seedlings is sometimes noted, and may occasion the loss of the whole stock. It generally makes its appearance where leaf mould or other regrettable substance which is not thoroughly decomposed has been used, or where plants are overcrowded and not allowed sufficient light.

"In general, for raising plants from seeds no hard-and-fast rules for detail can be laid down. To obtain the best results the various surrounding circumstances must be taken into consideration, and the general treatment modified accordingly."

HANDY METHOD OF MEASURING GIRTH OF TREES.

Those who have to spend time in taking measurements of the girth or rubber and other trees will find the following method considerably shorten their labours. Take a piece of strong tough paper or highly-glazed calico, 1 or $1\frac{1}{2}$ inch wide, and measure it out into inches and feet. I have found the prepared tracing paper or cloth used in plan-making very good for this purpose. Begin the measurement a little way from the end of the tape, and through the one inch line put a strong large drawing pin, folding the rest of the tape over, and, if necessary, stitching it to keep the flat head of the drawing pin in place. The measuring tape is now ready for use, and if the girth of trees is to be measured the procedure is as follows:—Place the measuring tape round the tree, overlapping it, and press the drawing pin into the tape where it crosses again. This will leave a clean round hole in the tape, the length of which can either be recorded at the time, or else, if an average is required, the tape can be taken home and the number of holes at different distances recorded. The smallness of the diameter of the pin—about $\frac{1}{40}$ th of an inch—reduces the possibility of two measurements falling into one hole to a minimum. I have found that even when many hundred readings are taken all the holes can be deciphered.—"Straits' Agricultural Bulletin."

Tropical Industries.

TREES FOR THE TROPICS.

By HOWARD NEWPORT, F.R.H.S., Instructor in Tropical Agriculture and
Manager of the Kamerunga State Nursery.

SHADE AND ORNAMENTAL TREE AND SHRUB PLANTING, AND THEIR
NECESSARY TREATMENT, IN PUBLIC AND PRIVATE GROUNDS,
STREETS, ETC., IN NORTH QUEENSLAND.

It is often a matter of difficulty to committees of various public institutions, mayors, schoolmasters, and private individuals interested, once it has been decided that trees shall be planted, what to choose, where and how to get them, where to put them, and what, if anything, should be done subsequently. Having been in receipt of a number of letters asking for just this information, it is thought that a short article on the subject would be of general interest and utility, especially if coupled with a list embodying a short and not scientifically worded description of some available trees, plants, &c., especially suitable for these purposes in the tropics. The aim of the list is to be suggestive rather than exhaustive, and to give such information as may guide those interested in choosing such trees as may be suited as well to the conditions of their locality as to their ideas of ornament, variety of foliage, or style of growth.

What Sort of Trees to Select.—The sort of soil and the locality—*i.e.*, high exposed situation or low protected one—is, perhaps, the most important point, for however suitable the variety of tree may be for the purpose, if it is not going to adapt itself to its environment and thrive, it is never going to prove of use or ornament. The ordinary average soils of towns are not good from the agricultural or horticultural point of view. Most are hard and gravelly; but trees, fortunately, do not require the tilth or richness of the vegetable garden. Nevertheless, the tree has, if it is to grow any size, soon to send its roots far beyond the pit that may be and generally is dug and filled with good soil for it. So the tree must be selected that is likely to thrive in the hard, gravelly, the rocky, slaty, clayey, or loamy soil, and the subsoil of wash or gravel, of sand, of deep free soil, sheet rock or boulder, as the case may be. Again, the fact as to whether the situation is dry and well drained or inclined to be swampy, whether the situation is high and exposed or low and protected, has a material bearing on the kind of tree that must be obtained. If exposed and likely to be affected by wind, trees, not only of deep tap root and able to maintain their upright position, but such as are in themselves strong-limbed or fibrous, must be chosen. Nothing looks more disastrous after a windy night than to see the streets strewn with broken limbs and trees blown out of the perpendicular. Even trees that are susceptible to the effect of wind, and which turn their branches from it and grow most strongly on the protected side, when in a row down a street, give a very lob-sided appearance to the whole locality. Some of our local towns are built on sandy soils not far from the seashore, and in which water, either brackish or pure, is to be met with at but

a few feet below the surface. In such, disaster is only courted by planting trees, however suitable and beautiful otherwise, that require well-drained situations. Such may grow at first, but as soon as the roots reach the wet ground speedily die out. There are trees, very handsome as shade, that revel in just such situations. Nor need the waste patches about a town be neglected because they are apparently pure dry sand; there are many trees that will grow readily and quickly in apparently dry sand, will find their own moisture, and also quickly aid in the production of grass or in the consolidation of the surface by the binding action of their roots and the dropped leaves, &c.

So for localities such as esplanades or promenades at or near sea-level, or what are called maritime situations, high elevations, or windy sites where a wind break is desired, must trees having special qualities of growth or adaptability to such conditions be chosen before their other qualities, however pretty or desirable, can be considered.

In districts favoured by a heavy rainfall many trees can be grown that will not thrive in the drier inland places. Indeed, in the latter case the choice is often very much restricted, but at the same time some species of trees will thrive there that the heavy rainfall will keep stunted or not permit to grow at all in the richer coastal country.

Next, the tree itself must be thought of; and the advantages and disadvantages of such matters as flowering and non-flowering, those otherwise suitable but which produce fruit, are deciduous and require a periodical collecting of the fallen leaves, or are non-deciduous—trees of drooping habit or upright growth, or which have a large surface root growth, &c.—must be duly weighed. Many trees may be found of combined qualities useful under special conditions. Generally for street planting, unless very large, trees of drooping habit, deciduous, or which bear fruit, are inadvisable. Whether flowering or not is immaterial; but, as a rule, flowering trees are less admired in streets than those of upright growth, fair spread, symmetrical habit, non-deciduous, and evergreen in the tropical countries. Under tropical conditions also more shade is required than in more temperate climes, and larger trees can be used with effect and advantage. Fruiting trees are not advisable for obvious reasons, and one or more rows of trees of a similar species, at any rate, in the one street give the best effect.

For parks, large recreation reserves, esplanades, and public grounds, the trees of drooping habit, of widespread and various foliage, are appropriate whether flowering or not. Large spreading leguminous trees that admit of grass growing under them right up to the trunk are useful here, while essentially flowering trees are, perhaps, most admired round hospitals and schools. Near buildings or masonry, trees with large spreading surface root growth, such as most of the figs, should be avoided, as sooner or later occasioning trouble. Thus it will be seen that it but seldom happens that the streets of a township can be uniformly planted up with one species of tree with success, and in other matters uniformity of species means generally an undesirable monotony that is not artistic or admired.

Obtaining Plants.—Once the special variety of tree or trees is selected, the real work of the committee or individual begins. For the extreme North such trees or plants as have been proved to be adapted to the tropical conditions and have been propagated there are not only more satisfactory but cost less in freight to obtain, and less risk is run of loss during transit. If the particulars given in the list against each species do not seem adequate, or any doubt is felt, it would be advisable to send notes of the particulars described above to the official through whom the plants are obtained, and who will supply the information or advice required. When ordering, it is always advisable to

make all arrangements for the transit and receipt of the plants, and at the same time state whether arrangements have been made for planting out promptly on arrival. Plants, however hardy or sturdy in the nursery bed, cannot but suffer if kept for a week or ten days awaiting replanting.

Pits for Trees.—As soon as the plants are expected, therefore, it behoves the committee to see about pits for them. Pits are always advisable even in sandy loose soils. For trees these should be 2 to 3 feet wide at least, by 18 inches to 2 feet deep. After digging, it is best to leave them open for a week or so—if possible, until after a shower of rain. Should any large stones or rocks appear, especially immediately beneath where the plant is to be, they should be removed. In refilling pits, unless the soil is passably good, a barrow full or two of soil known to be good should be added to give the plant a good start. This soil should be carefully mixed with the soil taken out, and the pit filled to surface level, or a very little higher, to allow for subsidence. Pits should not be *filled* with new rich soil, for then the tree grows too quickly to begin with, and is not strong or hardy enough subsequently to fight its own way in the natural soil when it has got beyond the artificial ground. Sometimes trees will in this manner become so soft that they are unable to obtain any nourishment after that of the pit they started in is exhausted, especially if manure is used, and they die. Such generally attract attention by rapid growth at first, and subsequently the variety of plant, or climate, or anything except the method, is blamed for its want of success. A little manure may be used to mix in with soils if desired, but is not necessary. Much manure is bad. Manure (well-rotted stable) is far more successfully applied to the surface and dug lightly in later on when the tree is one to three or four years old—in fact, as a welcome assistance when it is fighting its way down to establish itself in perhaps an uncongenial subsoil.

Guards for Trees.—The next matter is the tree guards. If a tree is worth planting, it is worth guarding. If merely a congenial change of fodder for goats and stray cattle is contemplated, cheaper methods than that of planting trees could no doubt be devised with a little thought. The guards should, therefore, be high enough—at least 4 feet—strong enough to withstand cattle, and wide enough to admit of persons getting inside to weed, &c., to really guard the plant against the evils threatening it. In making guards, to arrange for a panel easily removed or even for a small gate which can be securely fastened costs generally but little more and is well worth while.

Planting Trees.—All the pits for the one planting should, if possible, be filled in and ready on arrival of the plants. The last plant put in after it has been hawked round on a hot day by the man filling in and planting as he goes has naturally but a poor chance compared with the first put in. In planting, each plant should be held by the stem while the roots are opened out, and if crooked bent straight, for in packing the roots are almost sure to become folded in and the earth to have fallen away from them. The roots will probably have been pruned back sufficiently by the sender, and had, therefore, better not be touched with the knife again. A hole of the necessary size having been scooped out of the newly filled in earth in the middle of the pit, the plant should be held in position while the soil is gently returned. Care must then be taken to press the earth firmly with the hand, below each layer of roots in turn, towards the tap or main root; and, finally, to press the soil in level with the surface with the hands and not with the feet. A common mistake is in the idea that the plant is being given a better chance when deeply planted. This is a fallacy that only experience will eradicate, but, as a matter of fact, more plants are killed by too deep planting than by almost any other means. Care should be taken in setting the plant, therefore, to see that it is no deeper in the ground than it was previously, and which can be seen by the colour of the bark on the stem.

SISAL FIBRE.

Following are the concluding remarks of a special report by Commissioner F. H. Watkins "Upon the Caicos Islands, with special reference to the further development of the Sisal Industry," dated June last, which we take from the "Tropical Agriculturist," Ceylon. These remarks are of special interest to Queensland sisal planters; particularly should they note paragraphs 3 and 4, under the head of "Advantages."

GENERAL CONCLUSIONS.

Before embarking on any industry it is well to study carefully all the circumstances connected therewith, and to weigh the probable chances of success or failure. In the sisal industry there exist three essential conditions necessary to arrive at profitable results, namely:—

(1.) Capital, on account of the somewhat expensive machinery for extracting the fibre, and the length of time which must elapse before a return is made for the expenditure of several years.

(2.) A large area of land, especially where the soil is poor, to maintain the cultivation in regular succession.

(3.) An abundant and cheap supply of labour.

The last two conditions can be fulfilled in the Caicos Islands; capital has to be introduced.

It may not be out of place to consider briefly and summarise what may be regarded as the advantages and disadvantages associated with the industry.

ADVANTAGES.

(1.) Land may be purchased cheaply or obtained at a nominal rent, 4d. per acre, in the Caicos Islands.

(2.) The experience, which, in the initial stages of all undertakings, has to be purchased by inevitable mistakes at considerable cost, is now available.

(3.) It may be thought that, if more fibre is produced in these islands, the prices may fall, but it is improbable that the largest possible output of the Bahamas and of the Caicos Islands would ever be sufficient to exert an appreciable effect on the question of supply and demand in the fibre market. On the contrary, it is important that the export of fibre from the Bahamas and these islands should be increased to justify a separate name (*e.g.*, as Sea Island, in the case of cotton) to distinguish it from that produced in Yucatan. At present, the price of the fibre exported from these islands is, in spite of its superiority, governed largely by that obtained for the inferior qualities made in Mexico.

(4.) The universal usefulness of and the enormous and continuous demand for sisal preclude the possibility of overproduction. In 1905, the total export of sisal from Mexico amounted to 597,289 bales, weighing 212,375,231 lb., of the value of 90,625,430 dollars (Mexican).

(5.) When once the industry is firmly established and the initial stages passed, remunerative prices are always obtained for sisal properly extracted and graded. As an index of what returns may be expected, the figures of the last eighteen years, given below, may be instructive:—

(1) Lowest price obtained, 2½ cents per lb., equal to £12 5s. per ton.

(2) Highest price obtained, 8½ cents per lb., equal to £39 13s. 4d. per ton.

(3) Average price, 6 cents per lb., equal to £28 per ton.

(4) Present price, 6⅞ cents per lb., equal to £32 1s. 8d. per ton.

A rough estimate of the cost of production, exclusive of purchase or rent of land, machinery, freight, supplies, commission, and interest, but inclusive of local salaries and wages, may be placed at £7 to £10 a ton.

(6.) The unconquerable vitality of the plant and the fact that the fibre, when extracted, does not deteriorate by lengthy storage, are important matters for consideration.

(7.) As it is improbable that the sisal plant would thrive within a "frost-visited" region, the possible area of cultivation is limited, and, as has already been indicated, the plant requires a peculiar soil for its most favourable and profitable growth.

(8.) Looking at the industry from an official standpoint, its development would put to profitable use large tracts of land unsuitable for any other cultivation, and would afford, on a large scale, employment to many who, even now, have oftentimes the alternative between starvation and emigration.

DISADVANTAGES.

(1.) Chief among the drawbacks attached to sisal cultivation is the slow return for the outlay, because four or five years have to elapse after planting before the fibre can be placed on the market.

(2.) The soil suitable for sisal is such as to preclude the possibility of catch and rotation crops, and there are no by-products to aid in meeting the expenditure of the long years in the early stages.

(3.) The isolated life and peculiar conditions of the Caicos Islands are not likely to prove attractive to those desirous of settling and managing their own properties. It is far more satisfactory and economical to place in charge men acquainted with local conditions and the habits and character of the native labourer than to send out as managers men who, however well qualified they may be to supervise machinery, are ignorant of the elements of tropical agriculture. Unaccustomed to the climate, food, and people, the newcomers, although receiving double the salary given to a man born in the place, speedily grow dissatisfied, and the chances of success are hampered by constant changes in the management and by the pet schemes and experiments of each new manager.

SMOKED RUBBER.

DA COSTA'S PATENT RUBBER COAGULATING PLANT.

Whatever may be the differences of opinion between manufacturers as to the value of the different species of crude rubber available in the world's markets, they are certainly unanimous in pronouncing the product of the Pára rubber-tree, as prepared by the natives, to be the best of all species of rubber. The native process of smoking the latex of the *Hevea brasiliensis* (Pára rubber) in the Amazon region is only persisted in because no other process has met with the approval of manufacturers.

Sheet and crêpe rubber were manufactured in Brazil long before the rubber industry was thought of in the East Indies, but it had to be abandoned because of the manufacturers' preference for the native smoked product.

Every chemical ingredient now used in the East Indies to preserve the rubber or assist in the coagulation has been tried again and again, and, in every instance, where the assistance of chemicals has been resorted to, an article of good appearance has been produced, but always inferior to the smoked rubber when tested by the manufacturers' standard. The fact is that any chemical agent, of whatever nature, introduced into the latex of the Pára tree in a liquid or palpable form, injures the resiliency of the rubber produced, as repeated trials have clearly demonstrated.

The real cause of this continues to be one of Nature's mysteries, but it is an undoubted fact. Whilst it is known by long experience on the Brazilian forests that heat will coagulate the latex from the Pára tree, it is also beyond

doubt that fumigation alone will impart to the finished product its lasting properties of resiliency and tensile strength that have made the products of the *Hevea brasiliensis* famous all the world over. So, too, as regards the latex of the *Castilloa elastica* tree, nothing but very fierce heat will kill the enzymes it contains, and unless these are destroyed the rubber produced therefrom will always be jet black and more or less tacky, if kept for any length of time.

On the face of these facts, and because the method of smoking latex by the native process in Brazil is not only very expensive and exceedingly tedious, but also certainly detrimental to the health of the operators, the inventor of this plant thought of devising means of

DOING MECHANICALLY

all that is now done by hand in the rubber forests of Brazil. The Da Costa Patent Coagulating Plant, which is the result of practical experiments and tests, and is now manufactured solely by Messrs. David Bridge and Co., engineers and rubber machinists, Castleton, Manchester, England, for whom Messrs. Zacharias and Co., of Kuala Lumpur, are acting as sole agents in the Malay Peninsula, needs no chemicals of whatsoever nature, so long as tropical forest woods are available for heating the boiler, as well as green foliage of palms of any sort for generating smoke in the boiler furnace. The coagulating and smoking by means of this plant is the simplest of all operations in the rubber industry, and may be performed by any inexperienced hand. The process is as follows:—The latex being brought from the field is strained only, provided it contains mechanical impurities, and is then poured into the coagulating tanks. Steam is meanwhile being raised to about 30 to 35 lb. per square inch in the boiler, forest woods alone being used for this purpose. On the burning wood in the boiler furnace are then thrown green palm leaves, nuts, or any green twigs of tropical trees; the distillation of the woods producing acetic acid, whilst the fumes of the green foliage would be found to contain creosote to some extent. These fumes are accumulated in a special receptacle, after being expunged of all cinders, and are then forced into the coagulating tanks by a steam injector. The force of the steam violently agitates the latex, and during this operation every particle of it is reached by the smoke. In about ten minutes (more if the quantities to be dealt with are large) the whole mass coagulates, and separates from the lyes, and floats in the water caused by the condensation of the steam injected into the tanks. The coagulated substance is allowed to cool off in the tanks, and must afterwards be taken to a small press and blocks, are then reblocked in cube form, and afterwards dried either in a special stove or vacuum dryer. If the first size blocks are only lightly compressed into the form of cubes, they can be easily torn asunder by the manufacturers, and used in their machines without the extra labour of previously cutting them into convenient sizes.

QUALITY OF THE RUBBER PREPARED.

Rubber prepared in this way retains every native element of the resiliency and tensile strength of the native *Pára*, and will last as long as the wild rubber if kept in a crude state for years.

This coagulating plant has, therefore, not only the advantages of dispensing with the assistance of chemical agents in a liquid form, but also allows the producer to send to the market the only preparation that satisfies all the rubber manufacturers' needs throughout the whole world. In addition to this, it also possesses the unique property of being the only apparatus which can convert the latex of the *Castilloa elastica*, *Funtumia elastica*, &c., into a rubber of equal market value, appearance, and colour to that of the best *Pára* exported from Brazil.

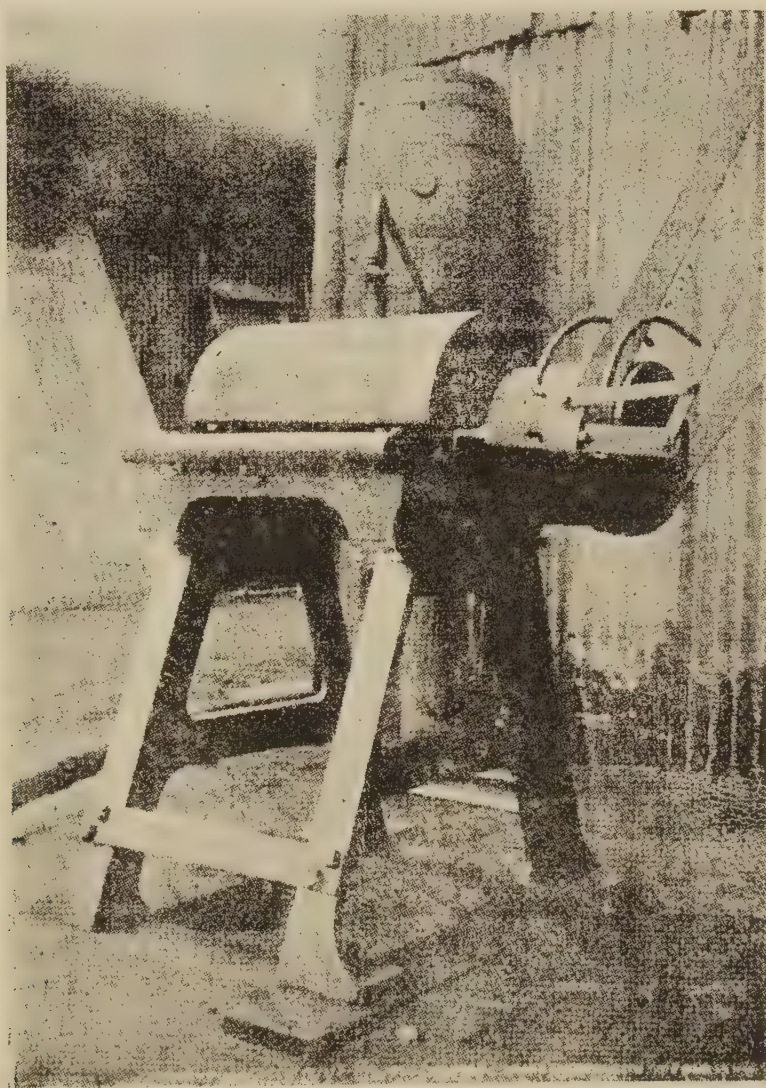
RUBBER MANUFACTURER'S REPORT.

A rubber manufacturer's report regarding smoked rubber produced by Da Costa's Patent Coagulating Plant is as follows:—

Referring to your letter of the 6th of September, *re* special smoked Pára rubber sample, I have pleasure in passing you under separate cover to-day a piece of the rubber washed out from the sample sent, as well as a piece of the prepared vulcanised sheet, 3/16-inch thick, made from the same sample. May be seen at Messrs. Zacharias, Limited, Co.'s office. The mixture, of course, contained no drugs or other material, but just sufficient sulphur for vulcanising purposes. There are also three round samples, 5/16-inch and 3/8-inch and 7/16-inch diameter. There are four samples of vulcanised rubber, and the sample of washed rubber will show up the value and quality of the rubber. I am very pleased with the rubber, and must say it has worked out better than I really expected, and I consider the smoked rubber worth anything from 4s. 6d. to 5s. 6d. per lb.; there is, however, an excess of moisture over and above the best Pára.—“Malay Mail,” 23rd December.

A NEW MACHINE FOR SCUTCHING SISAL LEAVES.

The quarterly magazine of the Madras Agri-Horticultural Society, for the quarter ended 30th September, 1907, contains the following description of a machine for decorticating agave fibre, of which the superintendent, Mr. B. F. Cavanagh, says that it combines the qualifications of cheapness, simplicity of structure, and a fair out-turn of clean fibre.



The machine is made by Messrs. Oakes and Co., Beehive Foundry, Madras, who state that it receives two leaves at a time, will decorticate 6,500 lb. of aloe (*sic*) leaves in a day of ten hours, yielding from 3 to 4 per cent. of clean fibre, according to the species of leaf used; another 1½ to 2 per cent. of fibre can be recovered from the waste.*

* This means that the machine will turn out from 195 lb. to 260 lb. of clean fibre per day of ten hours; value, from £3 to £4.—Ed. “Q.A.J.”

Mr. L. E. Kirwan, hon. secretary of the society, writes:—

The machine can be driven by a hand gear by coolies, by a bullock gear, or preferably by a $1\frac{1}{2}$ -h.p. oil engine. Through the courtesy of Mr. Bryant, the manager of Messrs. Oakes and Co.'s Beehive Foundry, Mr. M. E. Couchman, the Director of Agriculture in Madras, the hon. secretary and myself witnessed a practical test with one of these machines, which was, on the whole, satisfactory. Mr. Bryant expressed the opinion that the machine could easily be made portable by bolting the frame to a strong trolley, but as to this some doubt was expressed. No doubt on good metalled roads this might be done, but there would be great difficulty in transporting such a machine over roads which are in many cases mere cart tracks. Compared with such machines as the "Todd," which is considered one of the best, it has, however, certain material advantages.

1st.—Its cost is only 375 rupees, and four machines can, it is said, turn out as much work as one Todd machine, which would, in Madras, cost about 10,000 rupees.

2nd.—These machines, capable as they are of being worked by coolie or bullock power, could be arranged at convenient sites in the estate, and thus minimise the expense of carting the leaves over great distances.

3rd.—Manual labour being cheap and plentiful, it would save the cost of an engine.

The mechanism of the machine is simple, a great factor in its favour. It consists of an iron frame on four strong iron supports, which can be made fixtures in the ground, or, as before stated, riveted to a trolley. The revolving drum, which is the beater, has raised bars across its length at intervals of a few inches. On the front plate the scraper is fixed; this, by means of two bolts, may be adjusted to take any thickness of leaf. There is also a strong spring at the back of this scraper, which prevents the leaf jamming, and also prevents the fibre from being destroyed by too great pressure.

The photograph shows only the machine. A driving belt can easily be attached to a large fly-wheel to be worked by coolies, who are said to be able to get up a speed of from 400 to 500 revolutions per minute. With a $1\frac{1}{2}$ -h.p. oil engine, however, the speed can be increased to 800 revolutions, thus ensuring quicker and cleaner work.

Ten leaves of the *Agave rigida*, var. *sisalana*, of an average length of 4 feet, and weighing 15 lb., were passed through the machine, and the fibre carefully collected and dried. This test resulted in 8 oz. of clean fibre, equivalent to 3.32 per cent.; the waste, it was calculated, would show the leaves as containing almost 6 per cent. of fibre.

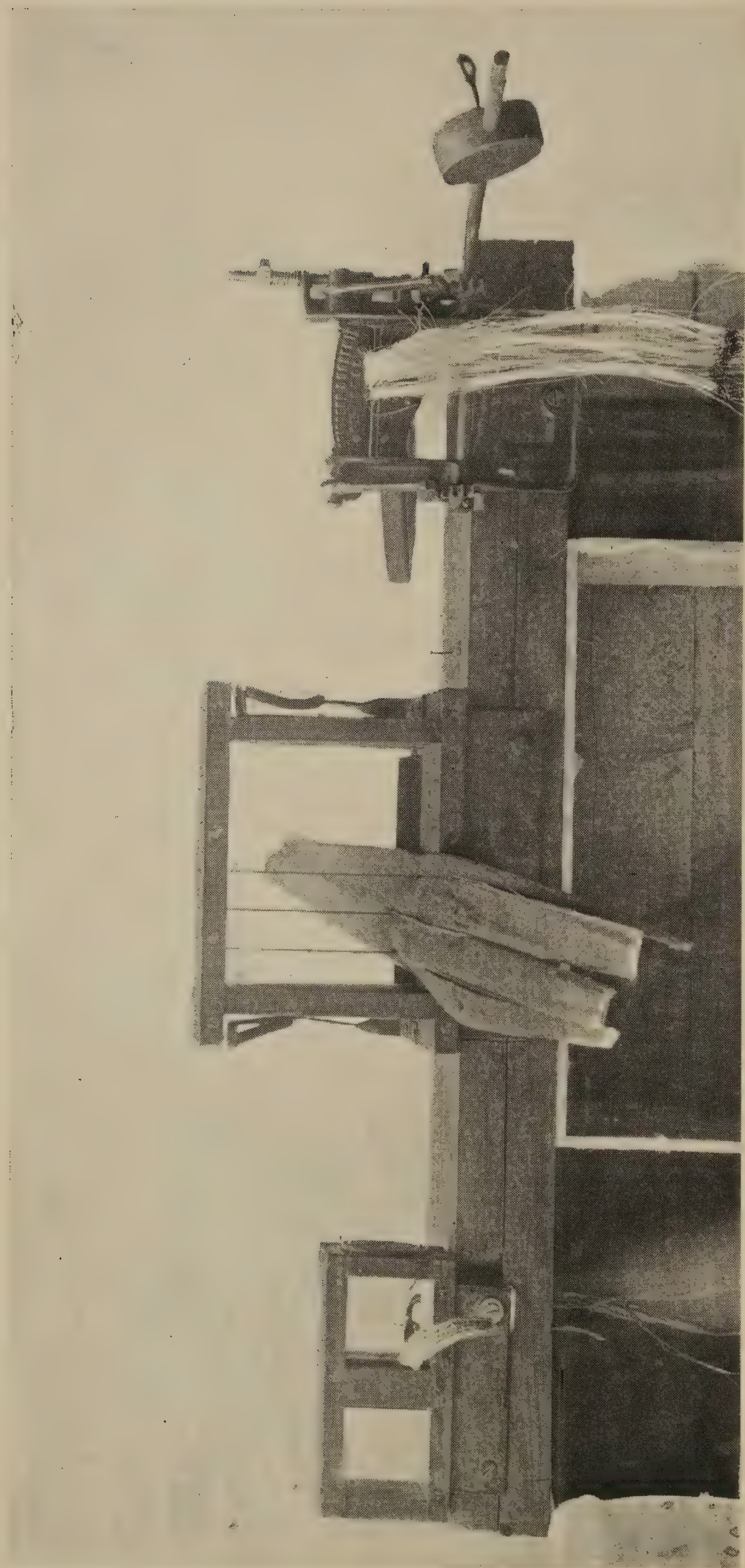
The fibre, after being passed through water after leaving the machine, was white, with a good lustre, and did not appear to have been weakened in any way.

Mr. Couchman in his remarks said:—"The result of this trial—viz., the extraction of 3.75 per cent. of good fibre—is very good indeed, and these leaves appear to have actually contained nearly 6 per cent. of fibre, which is extraordinary."

The results of these experiments were communicated to Mr. J. C. Large, of the Cascades, Yercaud, who has been working a machine of a similar type experimentally. He wrote as follows:—

"The machines should be run at a speed of 800 to 1,000 revolutions a minute. I found here that that is the best speed to obtain good results, as I have one of the same kind, only not so wide. I wish you would try a few leaves of a given weight right through the machine and the fibre snatched from under, and compare the results with those that are drawn back and reversed. Hold the leaf by the tip end. I am convinced that that is the only way to prevent the enormous waste. What they really want is a double pair of revolving rollers in front of the drum—a larger pair to crush the leaf, and the smaller pair to grip the leaf and gradually let it through to the beating drum—when

Plate XXI.



THE DUCHEMIN BANANA FIBRE EXTRACTOR.

the end would be cleaned, and the fibre would be snatched away from the bottom. There would then be comparatively little waste, and all the time wasted in drawing back the fibre would be saved. The roller, of course, must revolve at a much lower speed than the drum. You should time the work to ascertain the output of green leaf and fibre. My small machine, at which only one coolie can work, will do at the rate of 5,500 lb. of leaf in ten hours; theirs, which is double the width, and at which two men can work, should do double this. I do not think their plan of doing 6 inches of the tip first will answer, as many of the fibres will slip away when the butt end is finished. The fibres all start from the butt end, and many of them end before the tip is reached. Your out-turn of nearly 8 oz. fibre from $15\frac{1}{2}$ lb. of leaves equals 3.32 per cent., whilst mine, of nearly $1\frac{1}{4}$ oz., or say $1\frac{1}{8}$ oz., from $1\frac{1}{2}$ lb. leaf going right through, gives 4.67 per cent., which shows an enormous saving.

THE DUCHEMIN MACHINE FOR THE EXTRACTION OF BANANA FIBRE.

We have frequently pointed out the great loss suffered by banana-planters owing to the want of a machine for the extraction of the valuable fibre contained in the stems. Thousands of stems are every week cut down after the bunch of fruit has been removed. Every four of these stems contains enough fibre to make three rice sacks. The fibre is not contained in the whole of each sheath of fleshy layer, but only in the external part of each sheath. A well-grown banana stem is composed of about twenty-one layers or sheaths, 8 feet long. These layers may be divided into 155 ribbons, $\frac{4}{5}$ -inch wide, and will yield 5,000 feet of fibre. Since it requires 5,850 feet of fibre to make a rice or corn sack, it follows that, as stated above, four stems will suffice to make three sacks.

The apparatus here depicted was invented and patented by Mr. Eugene Duchemin, Paris, and, although it is a hand machine, it far surpasses in speed of work any contrivance yet devised for the extraction of banana fibre in the Philippines. It consists of a cutter with three or more vertical steel blades, through which the sheath is drawn, and is divided into strips of about an inch in width. When this operation is completed, the strips are passed through what is called the "depulper," which is merely a vertical knife fixed in a frame in such a manner that when the strip is passed through it edgeways the useless, fibreless pulp is removed, and the remaining outside part is then easily drawn through the final machine, which leaves the fibre perfectly clean.

An installation of the machine with its accessories includes three fibre-extractors, one triple-cutter, and one pulper. For Sansiviera and sisal leaves a small crushing machine is supplied, something like a miniature mangle with steel fluted rollers.

The price of the four portions of the installation is—pulper, 5s.; cutter, 13s. 4d.; fibre-extractor, £1 5s. As three of the latter machines are required, the total cost in France is £4 13s. 4d., or, with the crushing accessory (£1 8s. 4d.), £6 1s. 8d. To this has to be added, freight, duty, &c., which brings the total cost to between £7 and £8, or, including the crusher, £9 10s. to £10. One boy is needed to cut up the banana stems, another to pass them through the cutters, and a man for each fibre-extractor. Each man can, when used to the work, turn out from 60 to 70 lb. weight of clean fibre in a day. The machine would be of very great value at mission stations, where aborigines and kanakas are taught agriculture or trades. To the Chinese banana-growers, and especially to the Chinese labourers in the banana groves in the Far North, who only earn from 8s. to 10s. per week, the machine would be a boon, seeing that 60 lb. of good banana fibre is worth 13s. 4d., taking the market price of fibre at £25 per ton.

The agent for the machines is Mr. A. Robinson, Civil Service Stores. He has lent a machine to the Editor of this Journal. We have tried it, and,

notwithstanding inexperience in manipulating it, we succeeded in obtaining bright silvery fibre from an old banana stem which had been lying on the ground for several weeks.

It must be borne in mind that the machine is only calculated to add to the family income, by members of the family working in spare time or in wet weather. It is, therefore, admirably suited for districts like the Johnstone River and others where there is a long-continued heavy rainfall. The mission stations, both in Queensland, New Guinea, and the South Sea Islands, could also benefit largely by its use.

RETTING SISAL LEAVES IN SALT WATER.

In the issue of the "Queensland Agricultural Journal" for November, 1907, we mentioned that Mr. F. Main, who favourably criticised the two Queensland pamphlets on sisal culture in the "Journal d'Horticulture Tropicale," stated that he would like to have one very important point cleared up. The point was, whether fresh water is absolutely necessary for washing the fibre, or whether salt water would answer the same purpose. We have made the experiment, and the results were not satisfactory. The application of salt water to the fibre tended to dull the bright silvery sheen, and give it a harsh feel. When the leaves were retted in salt water—a lengthy process, extending over two months—the fibre lost its brilliant colour, and, when dried, was of a dull yellowish hue, whilst it felt harsh and rough to the touch. As far as strength was concerned, the fibre appeared to have gained instead of lost. Still, the loss of brightness by the use of salt water would no doubt have a considerable effect on the market price.

CAICOS ISLANDS' SISAL INDUSTRY.

LARGE AND CERTAIN PROFITS.

In more than one of our colonies in the West Indies the sisal hemp industry is an attractive field for investment, but particularly is this the case in the Caicos Islands, and a special report on the subject has just been published by the Colonial Office. The Commissioner of the Turks and Caicos Islands, who has prepared the report, says that two of the three essential conditions for the profitable cultivation of the fibre can be fulfilled in the Caicos Islands—viz., a large area of land and an abundant supply of cheap labour. What is missing is capital. The industry has been firmly established, on a limited scale, in the islands during the past eighteen years. The price of the fibre during this period has averaged £28 per ton, and the present price is £32 1s. 8d. per ton. The cost of production is roughly estimated at £7 to £10 per ton. This includes local salaries and wages, but not purchase or rent of land, machinery, freight, supplies, and commission. Land, however, is cheap in the Caicos Islands, and can be rented at 4d. per acre. With a larger output the Caicos fibre might make a name for itself (as Sea Island cotton has done), whereas now its price is largely governed by that obtained for the inferior qualities made in Mexico. Other advantages of this cultivation are named, as follows:—

The unconquerable vitality of the plant, and the fact that the fibre, when extracted, does not deteriorate by lengthy storage, are important matters for consideration.

As it is improbable that the sisal plant would thrive within a frost-visited region, the possible area of cultivation is limited, and, as has already been indicated, the plant requires a peculiar soil for its most favourable and profitable growth.

Looking at the industry from an official standpoint, its development would put to profitable use large tracts of land unsuitable for any other cultivation, and would afford, on a large scale, employment to many who, even now, have oftentimes the alternative between starvation and emigration.

The labourers on the existing plantations seem to relish their employment, and give no trouble. In former times the inhabitants supplemented the produce of the soil by what they could obtain "in the way of salvage or otherwise" from the numerous wrecks which occurred thereabouts. A lighthouse has reduced the number of wrecks to a minimum, but Mr. F. H. Watkins, the Commissioner, says that the occasional cry of "wreck" still appeals to many ears with equal force as the word "rats" to a terrier. The local drawbacks to the cultivation of sisal are the same as elsewhere: A delay of four or five years in return of outlay, and the impossibility of catch or rotation crops; but, nevertheless, "large and certain profits" are assured to sisal cultivators.—"Commercial Intelligence."

THE PAPELILLO: A NEW RUBBER PRODUCER.

The "Papelillo," writes the Belgian Legation at Mexico, is a tree belonging to the Euphorbiacea family, originating from Michoacan, the scientific name of which is *Euphorbia elastica*. Messrs. Altamirano and Rose call it "palo amarillo." The tree and its fruit can both be turned to good account. The fruit contains no latex, but yields an oil possessing various purgative and siccativ qualities, rendering it suitable for the manufacture of varnish and soap, &c. So far no attempt has been made to use the fruit.

The tree itself is said to be a veritable rubber producer, the latex giving an admirable result, both on the score of quantity and quality. The rubber obtained lends itself admirably to vulcanisation, and is quite up to the standard of the product obtained from the *Castilloa elastica*, the rubber tree *par excellence*. Each tree produces about 6 lb. of latex per annum; it is secured by cutting oblique incisions in the trunk, which heal up in about three months.

The "Papelillo" grows best in a warm climate, and is found in abundance in hilly volcanic lands; it attains a height of 8 metres, and can be easily grown from cuttings.

The tree is ready for tapping in from three to five years after planting; it will yield latex regularly for a period of ten years. It is calculated that the latex of the "Papelillo" contains from 18 to 20 per cent. of fine rubber, and 40 per cent. of resin or gum similar to Gum Damar, and suitable for making varnish.

In these days of tyres, waterproof clothing, and insulations, to mention but a few of the rubber-consuming industries, it seems that the "Papelillo" is a tree which demands careful consideration and fuller study.—"Tropical Life."

A NEW FIBRE.

Samples have been received in Washington (says "Garden and Field") of the fibre of a new plant discovered in Brazil, which, according to the United States Consul at Rio de Janeiro, may revolutionise the linen industry of the world. Experiments have reached a point where it is stated, without question, that the fibre is a success and that its influence will be felt in the fabric world. The plant is virtually a weed, growing from 12 to 18 feet high in four or five months, resembling in general appearance the hemp. It is hardy, requires no special cultivation, and matures so rapidly that three crops a year can be grown.

The fibre runs generally into three grades, the finest of which corresponds to the best linen, the second to coarse linen, and the third to European hemp. From the fibre of the plant, therefore, come both fine linen and strong rope.

The residue of the plant is suitable for the manufacture of fine writing paper, so that every portion of the plant can be used for some industrial purpose.

The process of producing fibre from the new plant has just been patented in the United States. Whether the plant can be grown in the southern portion of the Pacific Coast regions of America free from frost is not yet known. The subject merits the investigation of the agricultural and industrial authorities.

CIGAR-LEAF IN THE BOWEN DISTRICT.

The illustrations show 2 acres of tobacco being grown by Mr. A. E. J. Emmerson, of Amelia Vale, on the Andromache River, 54 miles from Bowen. Mr. R. S. Nevill writes respecting the soils in this district:—"Here are found large bodies of the finest lands for general agricultural purposes I have seen in the State, and they are especially adapted to tobacco-growing. This district should become the centre of a profitable farming as well as tobacco-growing industry. At present there are only two settlers for many miles."

Statistics.

COMMONWEALTH METEOROLOGY.

RAINFALL OF QUEENSLAND.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

STATIONS.	1907.										1908.		
	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
<i>North.</i>													
Bowen	1·97	0·39	3·46	2·87	Nil	1·28	0·51	0·06	3·71	6·39	10·14	5·63	9·46
Cairns	3·26	3·35	8·65	4·45	0·12	0·39	1·35	0·68	5·35	28·33	27·02	8·03	20·60
Geraldton	4·58	6·08	21·91	8·54	2·39	4·66	1·36	1·42	6·45	33·82	44·39	13·27	39·00
Herberton	2·05	0·90	1·57	2·71	Nil	0·11	0·12	0·17	3·41	9·57	9·29	5·02	8·92
Hughenden	1·17	0·16	1·34	0·95	1·16	Nil	Nil	1·66	0·66	7·75	0·98	5·18	6·91
Kamerunga State Nurs.	4·87	2·80	9·33	5·29	0·13	1·15	1·19	0·53	2·76	29·82	...	7·47	...
Mackay	8·01	1·58	6·09	5·04	0·27	0·25	0·12	0·12	5·76	9·70	9·28	3·83	17·43
Rockhampton	3·05	0·44	0·94	4·16	0·84	0·47	Nil	0·47	3·72	4·42	3·84	9·64	9·77
Townsville	7·37	1·03	3·11	2·38	Nil	0·07	0·14	0·03	2·82	24·26	12·21	6·69	9·03
<i>South.</i>													
Biggenden State Farm	10·91	0·34	4·02	5·24	1·51	0·96	0·24	1·99	2·50	5·55	...	9·82	...
Brisbane	5·32	0·45	4·75	2·91	0·39	0·79	0·10	1·37	4·25	3·21	2·80	8·43	18·19
Bundaberg	12·81	0·38	3·08	4·49	0·87	0·43	Nil	1·70	2·90	2·99	4·77	2·82	7·35
Dalby	3·72	0·20	2·26	2·35	0·87	0·71	0·15	0·69	5·18	1·44	0·17	4·88	7·61
Esk	3·60	0·22	5·42	2·66	0·54	0·81	0·57	0·50	3·76	3·72	2·61	10·06	...
Gatton Agric. College	2·71	Nil	2·80	1·85	0·51	0·56	0·15	0·71	3·01	4·55	...	3·38	...
Gindie State Farm ...	10·10	Nil	Nil	2·29	1·58	0·10	0·16	0·61	1·57	4·42	0·20	7·17	...
Gympie	8·93	1·12	3·84	3·77	0·80	0·17	0·47	1·20	3·05	5·49	6·26	11·77	80·8
Ipswich	1·95	0·12	3·43	2·22	0·30	0·43	0·05	0·78	4·45	3·40	1·32	6·63	13·77
Maryborough	10·28	1·25	3·21	6·05	0·64	0·93	0·25	2·74	3·49	5·81	5·62	8·07	11·40
Roma	1·87	0·42	0·27	2·47	1·03	0·42	0·04	1·04	3·70	2·51	0·04	6·38	2·51
Tewantin	11·45	1·87	7·16	7·61	1·48	0·95	0·55	1·05	3·12	7·36	10·42	12·47	...
Warwick	5·71	0·51	1·58	1·27	1·16	1·37	0·01	1·37	3·25	3·13	0·76	4·52	6·65
Westbrook State Farm	5·13	0·02	2·53	2·53	1·04	1·78	Nil	1·08	4·76	3·23	...	...	...
Yandina	...	...	...	...	...	...	...	...	...	...	...	...	16·62

NOTE.—The rainfall data in this table are compiled from telegraphic reports, and must be considered approximate only.

GEORGE G. BOND,
Divisional Officer.

Plate XXII.



MR. A. E. EMERSON'S TOBACCO PLANTATION, AMELIA VALE, ANDROMACHE RIVER, BOWEN, N.Q.

Plate XXIII.



CIGAR-LEAF TOBACCO ON MR. A. E. EMMERSON'S TOBACCO PLANTATION, AMELIA VALE,
ANDROMACHE RIVER, BOWEN, N.Q.

Science.

MENDEL'S LAW.

In our issue for October, 1907, we published a very interesting address, delivered before the Hawaiian Poultry Association, by Philip L. Weaver, on "Breeding," by laws discovered by Abbot Mendel, an Augustinian monk, of Brunn, in Austria, who conducted extensive experiments with cultivating peas in his monastery. In 1901, De Vries in Holland, Correns in Germany, Tschermak in Austria, and Speelman in America rediscovered the same principles of heredity independently, which are now known as "Mendel's Law."

The "Indian Trade Journal" now publishes a further account of this law under the head of

HEREDITY IN PLANT LIFE.

AN IMPORTANT DISCOVERY.

The scientific world is on the point of giving full recognition to a new, strange, and deep-rooted law, writes W. Beach Thomas in the "Daily Mail"; and it is a satisfaction to know that in a few months some of the most striking of its practical results will be published by a body of English scientists.

The new secret is known as Mendel's law. No one has yet been able to give an abstract description of its root principle or find any formula to express it. But the law seems to touch the ultimate mystery of heredity, and some of its workings may be prophesied with indisputable precision. Briefly, the law is this: When pure stocks or strains are crossed, it is found that a certain list of qualities—of which more are being discovered daily—remain, so to speak, indestructible, and appear uncontaminated in a definite proportion of the offspring of all generations after the first.

A concrete example will best show the practical effect of the law. When the tall variety of sweet pea and the short variety of sweet pea are crossed, the first generation are all tall. Tallness is the "dominant" quality over shortness, which is called "recessive." But in the second generation it is found that just one-quarter are dwarf, and not only are they dwarf, but they will remain pure dwarf, without any reversion, and when crossed with dwarf will never again show sign of tallness. The other three-quarters will be tall, and of these tall again just one-quarter will be pure tall, and never again show signs of dwarfness. The remaining two quarters will be impure, but again when crossed with their like will give both pure tall, pure dwarf, and mongrels in due proportion. So that we find in all grandchildren, so to speak, of pure strains the proportion 1:2:1 has a mystic application—that is, one-quarter of these grandchildren will be exact or pure reproductions in one quality of their grandmother, one-quarter will be pure reproductions of their grandfather, and two-quarters, though resembling one grandparent, will have latent in them the qualities of both.

THE NEW DARWINISM.

"Mendelism"—a word with which no doubt all shall soon be as glib as we are with "Darwinism" and "evolution"—is both a simple and a complex thing. The law in many of its workings is difficult to trace, and is open to dispute, but it has, as I have said, reached, especially in the hands of the Cambridge biologists, results that are plain and undoubted. The apparent anomalies issuing from the law of heredity that Mendel discovered have baffled both breeders of animals and cultivators of plants for centuries. In regard to animals, the simplest and best known case in common experience is perhaps

that of the blue Andalusian fowl. If the pure black and speckled white varieties be mated together, all the chickens will be "blue Andalusians." But mate two of the blue Andalusians, and it always happens that the chickens are of three sorts—some black, some speckled white, some of the composite colour known as blue Andalusian, and the most inexplicable fact in this family picture of inherited qualities is that both the blacks and the whites, as also half of the descendants of the blue's in the next generation may be called pure bred—that is, in certain definite respects no trace of the cross will again appear in their progeny. This issue, though it has a rather different appearance, is theoretically much the same as in the case of the peas, and proves the existence of a deep-rooted law that will revolutionise the science of developing varieties.

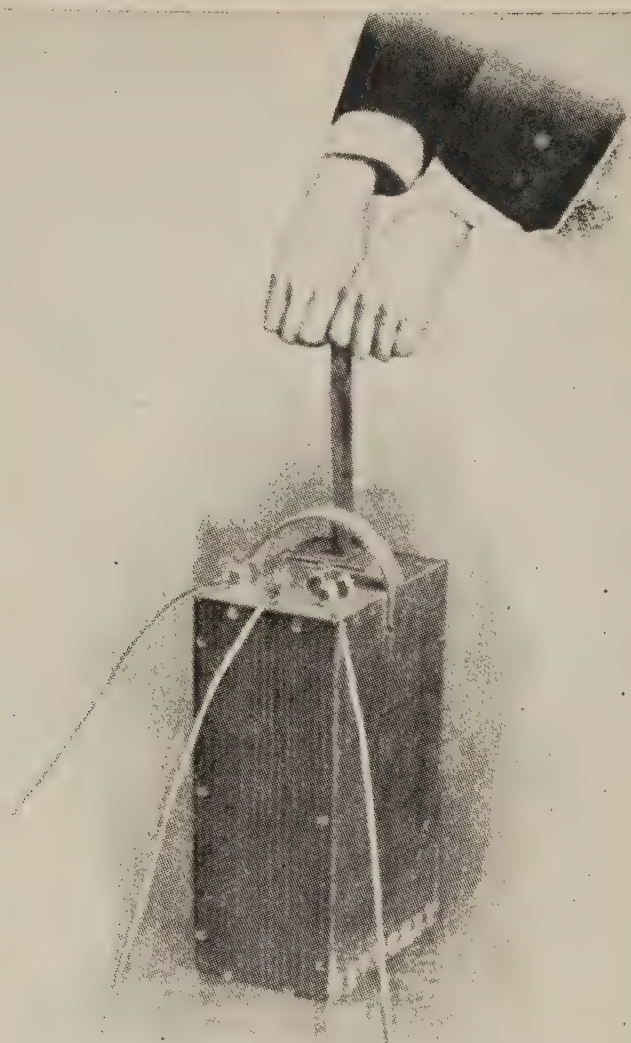
PROFITABLE VARIETIES OF WHEAT.

In the Cambridge experiments, wheat has been found to be endowed above other plants with "Mendelian characteristics." The strength of the straw, the length of the ear, the quality of the grain, the resistance to rust—that bane to farmers—all answer to the test. The result is that a man of science can in these respects turn out a new wheat to order within two years, and be quite certain that it will keep true. This has been already done. The great triumph of the Cambridge experiments is to have created a wheat which combines the "strength" of Manitoba hard grain with the yield of the softer English wheats, and it is maintained that already the value of the English wheat crop can be improved by 10s. or more per acre. This is but a foretaste of what can be done. It is expected, for example, that a turnip of vastly increased food value will soon be "fixed." We may presently have a potato with a double percentage of alcohol, and English farmers would thus be able to feed their beasts at reduced cost, and perhaps manufacture out of their own tubers alcohol for driving their own machines and cultivators.

Of course, in the past wonders have been effected by those scientists, known as "the fancy," in getting new varieties of animals and plants, but the work has been done by slow and uncertain methods. Brewers and growers have picked out "sports," or exceptional individuals, and in each generation selected those offspring that had the largest share of the particular virtue required. Some of the successes have been remarkable, if slowly attained; but it has been found almost impossible to know which would breed true; and the pure stocks have often been found miserably delicate. With the help of the new law more wonderful results can be attained within no more than two or three years and with great certainty. Incidentally, the whole conception of what is meant by a pure breed has been altered. The new knowledge will enable the scientific grower to get a pure stock by crossing with stocks once thought impure, and thus give to the new variety at any time that it may be required all the strength of the mongrel without in the least impairing its pure character.

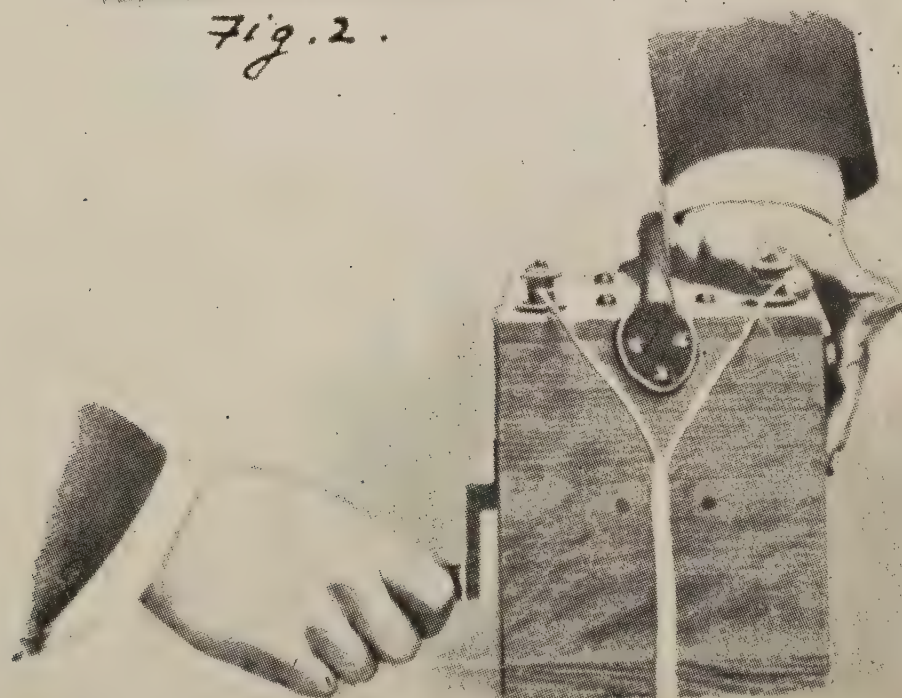
EXTRACTION OF TREE STUMPS BY ELECTRICITY.

The great expense consequent upon clearing new land and removing the stumps to enable the plough to be used is often beyond the means of many pioneer farmers, and particularly is this the case where heavily timbered forest land has to be dealt with. When scrub land has been felled and burnt off, the majority of the stumps rot out in the course of two or three years, but the hardwoods of the forest land will not rot out for a score of years, and many of them not in half a century. The application of electricity to blasting out stumps has reduced the labour of several hours to a few minutes only. From Messrs. Dalgety and Co. we have received a pamphlet detailing the method of clearing land by electric blasting of the stumps, and showing that little, if any,



Method of using Rackbar Exploder.

Fig. 2.



Method of using "Q" Exploder.

Fig. 1

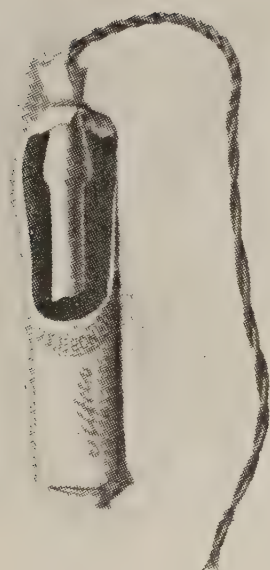


Fig. 3. E. D. Fuse inserted in Cartridge.

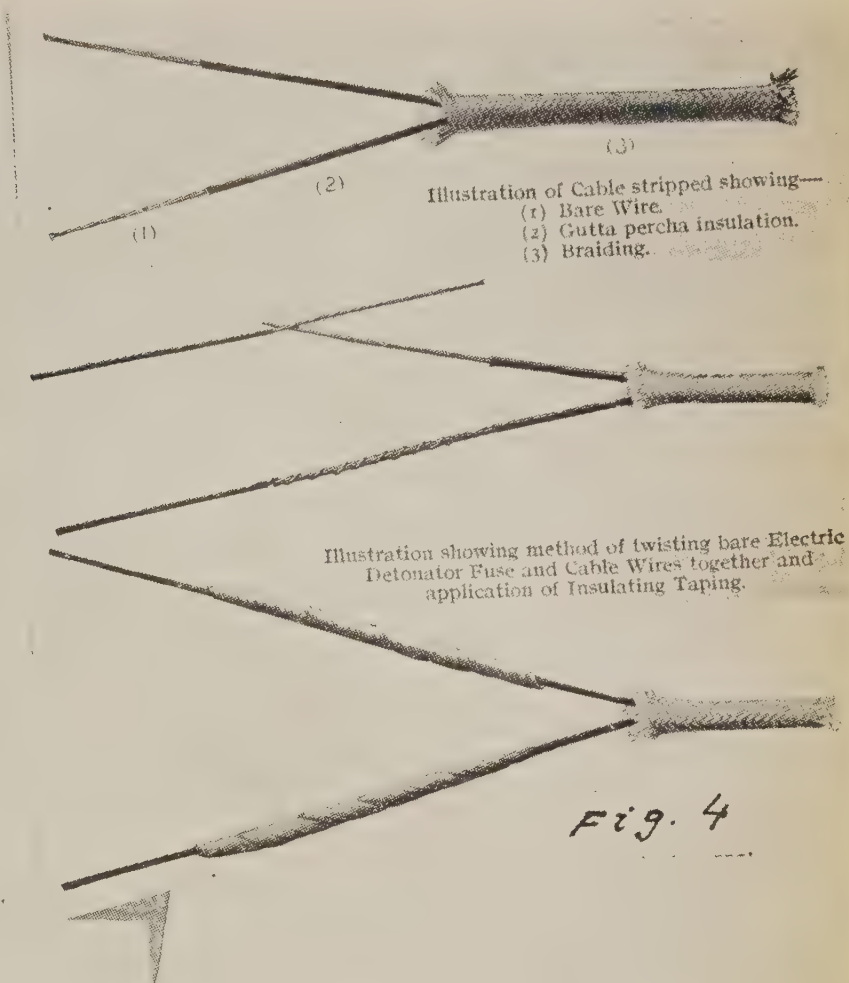


Fig. 4



Fig. 5. Method of using Rackbar Exploder.



Fig. 6

METHOD OF USING Q EXPLODER.

Plate XXVI.



Before Blasting.



The Blast.



After Blasting.

BLASTING STANDING TIMBER.

technical knowledge is necessary to carry out the work successfully; and the following instructions show that the process is simplicity itself. A stump is to be extracted. A hole is bored under it with a crowbar till the taproot is reached. Cartridges of blasting gelatine are placed in the hole; a detonator fuse is attached to the upper cartridge. The fuse wire is connected with the cable wire from the exploding machine; the operator retires to a safe distance, touches a firing button, and the stump or tree is torn from the ground. There are two kinds of exploders—viz., the "Rackbar" and the "Q" exploder. In firing with the latter (Fig. 1), grip the exploder firmly with the left hand, and with the right turn the handle rapidly thirty to forty times. When a high speed is attained, press the firing button, but not until this high speed has been got up. Then press the firing button. The same speed must be maintained while the button is being pressed. In firing with the "Rackbar" exploder (Fig. 2), the handle must be pulled up as far as it will come, and then forced down as rapidly as possible. As speed is of prime importance in obtaining the best possible result, both hands should be used to force down the handle till the bottom is sharply struck. Immediately after a shot has been fired, the operator should first disconnect the cable from the exploder and coil it up.

Preparing the Charge.—The cartridges should be of such size as to pass easily into the borehole, which should be $\frac{1}{16}$ -inch to $\frac{1}{8}$ -inch larger than the diameter of the cartridge, and they should be inserted singly. Press them gently but firmly into the hole with a wooden rammer, one at a time, so as to fill up the hole from side to side. This is very essential.

Adjusting Electric Detonator Fuse.—When the last cartridge (or primer cartridge) comes to be inserted, a hole should be made in it with a small pointed stick, and the detonator, attached to the fuse wire, should be pressed lightly therein, until completely buried in the cartridge. The operator then ties the cartridge-paper tightly over the wires with a piece of twine to prevent the withdrawal of the detonator from the explosive (Fig. 3). The primer cartridge is then gently pressed into the borehole by the wooden rammer or tamping-rod, and brought into contact with the main charge.

Tamping.—When all the necessary cartridges are in direct contact in the borehole, ram in a little clay or damp earth, and then wet it or use mud for filling the entire opening. Loose gravel, sand, stones, &c., are of little service. Use only a wooden tamping-rod.

Connecting Electric Detonator Fuses to Cable.—The ends of the fuse wires and cable wires should be stripped for about 2 inches, and scraped perfectly bright and clean. They should then be carefully joined together by twisting the bare end of the fuse wire tightly round the bare end of the cable wire (Fig. 4).

If the wires of the fuses are not long enough to connect up to each other, use wire from fuses previously used, so long as the insulation is not damaged.

Firing by Aid of Electric Cable and Exploders.—When the charges have all been connected, the free wire of the first hole should be joined to one of the twin main cable wires, and the free wire of the last hole with the remaining wire of the cable (Fig. 5).

The cable should be long enough to enable the operator to reach a place of safety from the blast, or, if no natural or other shelter is available, say, to 80 or 100 yards away.

When ready, and everyone is at a safe distance, connect the cable to each of the projecting screws situated at the top of the exploder, and then screw the nuts firmly down upon the wires. The connection of the cable should not be made until everything is ready for firing, nor until all persons have retired to safety.

The effect of the blast on a large tree is shown on Plate XXVI.

Chemistry.

ANALYSES OF COMMERCIAL FERTILISERS.

TAKEN AND ANALYSED UNDER "THE FERTILISERS ACT OF 1905."

Fertiliser.	Where Obtained.	Moisture.	PHOSPHORIC ACID P_2O_5 .			Potash, K_2O .	Nitrogen, N.	MECHANICAL CONDITION.			Remarks.
			Water Soluble.	Citrate Soluble.	Total.			Coarse.	Medium.	Fine.	

SIMPLE FERTILISERS: POTASH MANURES.

Chloride of potash ...	Webster and Co., Ltd., Brisbane	...	...	...	...	61.32	...	...	...	...	
Sulphate of potash ...	ditto	...	...	...	...	51.58	...	...	...	...	
Kainite ...	ditto	5.81	...	...	...	13.00	...	...	...	...	
Sulphate of potash (first sample)	Paul and Gray, Limited	.28	...	...	...	52.38	...	...	...	...	
Sulphate of potash (second sample)	ditto	.74	...	...	...	52.48	...	...	...	...	

SIMPLE FERTILISERS: NITROGENOUS MANURES.

Ammonium sulphate ...	Brisbane Gas Company	.93	...	...	...	...	20.77	...	...	...	
Ditto ...	South Brisbane Gas Company	1.05	...	...	...	...	20.88	...	...	...	
Sodium nitrate ...	Webster and Co., Ltd., Brisbane	2.62	...	...	...	...	15.42	...	...	...	
Ammonium sulphate ...	ditto	1.17	...	...	...	...	20.55	...	...	...	

BONE, BLOOD, MEATWORKS MANURES.

Fertiliser ...	Baynes Bros., Brisbane	4.79	...	...	27.00	...	4.55	...	...	...	
Ditto (second sample) ...	ditto	5.41	...	...	27.55	...	4.80	...	...	...	
Bonedust ...	Jordan, Zillmere	5.86	...	...	27.60	...	2.69	52	28	20	
Ditto ...	Queensland Fertiliser Company,	6.84	...	...	26.70	...	3.60	58	24	18	
	Runcorn										
Ditto (second sample)	Jordan, Zillmere	6.30	...	...	27.40	...	3.34	24	64	12	

Fertiliser	...	...	Central Queensland Meat Export Company, Lake's Creek	5.66	...	18.16	...	5.25	...	...
Ditto	...	...	Taken by Inspector Williams, Rock-hampton	3.97	...	23.70	...	3.09	...	94
Ditto	...	...	Queensland Meat Export and Agency Co., Ltd., Ross River Works	6.24	...	12.86	...	7.02	...	...
Ditto	...	...	Jack and Newell, Cairns	7.28	...	15.16	...	6.24	...	...
Dried blood	...	...	Jordan, Zillmere	10.25	...	...	...	12.86	...	...
Bonemeal	...	...	Queensland Meat Export and Agency Co., Ltd., Brisbane	8.74	...	22.48	...	4.02	30.4	26.3
Dried blood	...	...	ditto	17.50	...	...	...	12.46	...	...
Fertiliser with blood	...	...	ditto	6.75	...	14.28	...	6.38	...	...
Dried blood	...	...	Fitzroy Poultry Food Company	9.60	...	...	...	11.95	...	...

MIXED FERTILISERS, SUPERPHOSPHATES, GUANOS, ETC.

Superphosphate	...	...	Webster and Co., Ltd., Brisbane	8.40	15.56	17.00	2.21	3.14	...	...	...	Sol. in Wagner's ammon. citrate sol.
Cereal guano	...	...	ditto	11.30	10.15	12.36	...	.84	...	74	26	...
Root guano	...	...	ditto	7.30	10.45	12.52	...	...	...	...	...	...
Basic slag	...	...	ditto	1.21	...	13.50	...	...	...	...	...	...
Shirley's superphosphate (first sample)	...	...	Paul and Gray, Limited	2.00	17.24	19.51	...	...	...	...	...	...
Shirley's superphosphate (second sample)	...	...	ditto	5.20	18.00	20.05	...	...	...	...	...	...
Shirley's Fertiliser, No. 3	...	...	ditto	4.68	12.82	15.56	...	3.32	...	...	...	Nitrogen as ammonia salts
Ditto	No. 5	...	ditto	5.90	14.29	14.53	5.95	3.27	...	...	...	ditto
Ditto (second sample)	No. 6	...	ditto	6.00	14.30	14.48	6.28	3.24	...	...	...	ditto
Ditto	No. 7	...	ditto	4.91	12.26	13.48	3.77	1.80	...	...	...	ditto
Ditto	No. 9	...	ditto	1.68	10.43	10.81	3.85	4.17	...	...	...	ditto
Ditto (second sample)	No. 10	...	ditto	2.50	9.10	10.56	4.15	3.94	...	...	...	ditto
Ditto	No. 11	...	ditto	4.31	12.25	13.90	6.15	...	...	...	...	...
Ditto (second sample)	No. 12	...	ditto	5.10	11.10	12.66	6.10	1.12	...	...	...	...
Superphosphate	...	...	Millaquin and Yengarie Sugar Co., Bundaberg	13.35	16.25	18.70	...	...	...	...	...	...
Yates soluble plant food	...	...	Burns, Twigg and Co., Rockhampton	4.13	12.00	12.96	6.90	2.89	...	...	...	...
Ohlendorff's guano	...	...	Gibbs, Bright, and Co., Brisbane	3.05	9.50	12.91	4.05	6.06	...	...	...	...

NOTE.—The samples of manures were taken by inspectors under “The Fertilisers Act of 1905,” and the results of the analyses show that the composition agrees closely with the guaranteed amounts of the fertilising ingredients—phosphoric acid, nitrogen, and potash.

J. C. BRÜNNICH,
Agricultural Chemist.

General Notes.

TO CURE WESTPHALIA HAMS.

For two of common size, mix 1 lb. of brown sugar, 1 lb. of fine salt, and 1 oz. of pulverised saltpetre. As soon as the hams are cut, rub them with common salt; leave them for two or three days to drain, then wipe them dry; rub them well with the mixture, and put them into deep pickling pans, with the rind downwards. Keep them well covered with the salt and sugar; the third day pour over each $\frac{1}{2}$ -pint of vinegar. Leave them in the brine for a month, turning them every day; then dry, and scrape off the salt; rub them with bran, and smoke for four weeks.

A SIMPLE METHOD OF DESTROYING GRASSHOPPERS.

(Translated from the "Tropenpflanzer.")

The "Deutsch-südwestafrikanische Zeitung," writing to the "Cape Times," says that it is possible to poison a swarm of grasshoppers without any danger to cattle, if the work is done carefully. This is proved by an experiment made by Farmer W. M. Hepley, at Vermaakfontein. The "Burgersdorp Zeitung" makes the following statement on the subject:—

The swarm which the above-named farmer destroyed was a very large one, covering an area 500 yards long and 200 yards wide. They were in the hopping stage, and travelled closely packed together. They had already consumed every green thing on the adjoining farm. A single pound of arsenate of soda sufficed to destroy the whole swarm. The poison was mixed with 4 lb. of brown sugar, and dissolved with hot water in a boiler. Then cold water was added until a quantity of 12 gallons was made up. Six ordinary bundles (about 36 lb.) of green barley were soaked in it for about fifteen or twenty minutes. The barley was not entirely immersed, but each bundle was loosened so that each stalk could fully absorb some of the liquid, of which about one-third was absorbed by the barley. By waving flags the swarm was brought to a standstill close to the boundary of the farm. Then the barley was thinly scattered both in front of and among the grasshoppers, in the following manner: Single haulms were scattered in thin rows over the swarm, each stalk in a row at a distance of about 4 feet from the other, and each row of stalks 10 yards from the next row. In front the stalks were laid thicker. In this manner the barley was distributed over the major portion of the swarm. The rear of the swarm was not interfered with, as there was not sufficient barley. This was, however, of no consequence, as later on the grasshoppers closed up towards the front, and so were enabled to reach the poisoned bait.

As soon as the poison had spread amongst the swarm they came to a sudden halt. This was a remarkable and astonishing effect. Other farmers who had employed the same means of destruction had observed the same thing. Mr. Hepley confessed that he had had his doubts about this result until he saw himself that the whole swarm stopped, and that in the most unexpected manner, on his own farm as soon as the poisoned barley was scattered amongst them. There was no need for further flag-waving, as the grasshoppers no longer showed any desire to spread over the field. The creatures attacked the barley with avidity. Every stalk was covered with hundreds of grasshoppers, which were all poisoned. Before sunset numbers of the insects appeared sick, but so far none had died.

About 8 gallons of the poisoned fluid was left over. This was used in the following manner: In the evening a number of grasshoppers, where they were thickest, were killed by blows from bushes. The bushes were steeped in the poison, and thus the hoppers were plentifully sprinkled with it. On the same evening the remains of the poisoned barley were carefully collected and burnt.

Next morning about one-third of the hoppers were dead, and the survivors were busy devouring them. No more poison was needed. Thenceforward the destruction proceeded automatically. In four days the whole swarm was annihilated. It is remarkable that birds which for two days had fed on the dead hoppers did not seem any the worse for it. The work was very easy, Mr. Hepley, his son, and two natives having been employed only two hours over the business. From the moment the poison was strewed over the swarm they made no attempt during the four days to move on.

ROYAL AGRICULTURAL SOCIETY'S SHOW, TOOWOOMBA.

The Westbrook State Farm will have a very fine exhibit at the above society's show on 4th, 5th, 6th, and 7th August. Considering the splendid season we have experienced, and are likely to experience, between this and August, the State Farm should be able to make a fine show of general farm and market garden produce.

VALUE OF THE POTATO.

It has been stated by an American doctor that the use of water in which potatoes have been boiled will effectually cure gravel by dissolving the calcareous deposit. The water must be strained, sweetened to taste, and used as a drink for two or three weeks. The same doctor has also declared that the coating of deposit inside a steam boiler may be removed by placing a quantity of raw potatoes in the boiler and letting them boil to pieces. After two or three days, a sandy deposit will be found. When this is washed out, the boiler is perfectly clean. We give this for what it is worth. Perhaps some of our readers will try the latter recipe, and let us know the result.

"QUEENSLAND AGRICULTURAL JOURNAL"—GENERAL INDEX.

The revised index to Vols. I. to XIX. of the Journal may now be obtained at this office. Price: ONE SHILLING.

Answers to Correspondents.

POISONOUS BERRIES.

M. E. H., Bogantungan.—

The seeds and berries you forwarded to us have been referred to the Government Botanist. The large pink seed is the *Canavalia ensiformis*, or Sword Bean, and is edible. The small brown seed is a variety of sword bean, the *Canavalia obtusifolia*. The red berries are the fruit of the *Solanum Seaforthianum*, and are poisonous.

Of the small bean, which grows wild in many coastal districts, Mr. Bailey is of the opinion that it *may* be injurious, but he hesitates to give a decided answer, as eminent authorities are not agreed on its properties. Baron von Mueller, late Government Botanist of Victoria, in his work on "Select Extra-tropical Plants," states that it is decidedly deleterious. On the other hand, Trimen, in his "Flora of Ceylon," published in 1903, states that the seeds are much eaten, when boiled, at Batticaloa and elsewhere. Where such eminent authorities differ so diametrically on this point, we cannot decide whether it is poisonous or not without making an experiment on some worthless animal.

A METAL HARDER THAN THE DIAMOND.

CONSTANT READER, Cairns.—

You should have referred your question to the Mines Department or to the "Government Mining Journal." As we happen, however, to have some information on the question, "Is there any metal harder than a diamond"? we submit the following, which appeared in the "West Australian Mining, Building, and Engineering Journal" (4th April):—

One of the most remarkable of the so-called rare metals is tantalum. It is not attacked by hydrochloric, nitric, or sulphuric acids, aqua regia, or alkaline solutions. It can be drawn into fine wire having a tensile strength greater than soft steel. A red-hot lump of tantalum may be at once hammered into a plate which, on repeated rehammering, becomes as hard as diamond. A diamond-drill running continuously for three days at 5,000 revolutions a minute failed to penetrate such a plate, although it was but 1 millimeter (the $\frac{3.9}{1,000}$ th part of an inch) thick, while the drill was much worn.

THE SEASONS.

FARMER, Dugandan.—

Spring begins on the 22nd September.

Summer begins on the 22nd December (the longest day).

Autumn begins on the 21st March.

Winter begins on the 21st June (the shortest day).

TROUBLE WITH COWS.

E. H. S., Butterfield, Gayndah.—

We have submitted your question to the Veterinary Surgeon to the Department, and he gives the following opinion. As you say that several of the dairy-men in your district are in the same dilemma, we give Mr. Dodd's opinion and treatment for their benefit also:—

The fault probably rests with the cows and not with the bulls, and I think there is every probability that the cows are suffering from contagious abortion.

TREATMENT.

Every cow in the herd should be treated as follows :—

The hips, tail, and the parts down to the bottom of the udder should be washed daily with a solution of corrosive sublimate in water in the proportion of 1 part of corrosive sublimate to 1,000 parts of water (1 in 1,000). The cows that fail to prove in calf should have their passages washed out once daily with a solution of corrosive sublimate, in the proportion of 1 part of corrosive sublimate to 2,000 parts of water, and this treatment should be continued for a week. About 1 quart of solution is sufficient for one injection. Cows that are continually returning to the bull should be similarly treated.

If any cows in the herd are noticed to slip their calves, the calves and their membranes should be immediately burned or buried, and the ground where they have laid should be disinfected with some sheep dip. Such cows should be isolated, and their passages should be washed out as described above for cows failing to prove in calf. Also, all cows in a herd affected with contagious abortion that calve at full time should be so treated for one week.

Do not put to the bull until at least a week has elapsed after the last injection. If at the end of this time there is noticed to be any discharge from the passages, the injections as above should be continued twice weekly until the discharge has ceased.

The bull should have his sheath syringed after every service with a solution of corrosive sublimate, in the proportion of 1 to 2,000 of water.

Corrosive sublimate can be bought in tabloids, 8.75 gr., one of which, dissolved in a quart of water, makes a solution of 1 part of corrosive sublimate to 2,000 parts of water (1 in 2,000).

For giving the injections the operator will require 3 feet of $\frac{1}{2}$ -inch rubber tubing, and an enamelled funnel attached to it. The hands of the operator and the tube should first be thoroughly washed with soap and water, and then rinsed in 1 in 1,000 corrosive sublimate solution. The rubber tube should be first oiled, and then passed gently into the passage, and the funnel held a little above the root of the tail. The solution should then be poured into the funnel, when it will gravitate into the passages.

An ordinary rubber Higginson enema syringe is a suitable instrument for washing out the bull's sheath.

The corrosive sublimate solution should be prepared in an enamelled, china, or earthenware vessel, as corrosive sublimate has a chemical action on metal.

All newly-purchased cows should be kept apart from those affected with this disease.

PRESERVATION OF STORED MAIZE.

W. H. R., Yatala.—

1. The application of carbon bi-sulphide suffices.
2. In the case of hermetically-sealed tanks, one application is sufficient. When bags are used, renew every fortnight.
3. It is not safe to use bi-sulphide with maize intended for seed purposes. Salt, in this case, is much safer.
4. The only other chemical we know of which will keep off the weevil is chloride of sodium (common salt). Use 1 oz. of bi-sulphide to 100 lb. of grain. Bags in which salt has been packed will keep off the weevil. Be careful not to allow a light to come near the bi-sulphide, as it is highly explosive.

TO TAN SKINS.

'Possum, Caboolture.—

You want us to tell you how to tan 'possum skins. Directions are given in the Journal, Vols. IV., V., and XVIII. Possibly you may not have these Journals; therefore "Possumus" once more as follows:—Over 2 quarts of bran pour 5 or 6 quarts of boiling water, then strain; make about an equal quantity of salt water by putting into water blood warm as much salt as it will dissolve. Mix the bran and salt water, and to each gallon of the mixture, when no more than lukewarm, add 1 oz. of sulphuric acid. Then immerse the skins, stirring them occasionally until tanned. Opossum skins will tan in about 20 minutes, and larger skins in proportion. When tanned, rinse in water and hang out in a shady place. The skins, if dry, should be soaked in water before tanning until they are quite soft, and all flesh and grease cleansed from them.

Times of Sunrise and Sunset at Brisbane, 1908.

DATE.	MAY.		JUNE.		JULY.		AUGUST.		PHASES OF THE MOON.
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	
1	6.14	5.16	6.30	5.0	6.39	5.4	6.30	5.18	1 May ☉ New Moon 1 33 a.m.
2	6.14	5.15	6.31	5.0	6.39	5.4	6.29	5.19	8 " ☾ First Quarter 9 23 p.m.
3	6.15	5.15	6.31	5.0	6.39	5.4	6.29	5.19	16 " ○ Full Moon 2 32 "
4	6.15	5.14	6.32	5.0	6.39	5.5	6.28	5.20	23 " ☽ Last Quarter 10 17 a.m.
5	6.16	5.13	6.32	5.0	6.39	5.5	6.28	5.20	30 " ☉ New Moon 1 14 p.m.
6	6.16	5.12	6.33	5.0	6.39	5.5	6.27	5.21	
7	6.17	5.12	6.33	4.59	6.39	5.6	6.26	5.21	7 June ☾ First Quarter 2 56 p.m.
8	6.17	5.11	6.33	4.59	6.39	5.6	6.25	5.22	14 " ○ Full Moon 11 55 "
9	6.18	5.10	6.34	4.59	6.39	5.7	6.24	5.22	21 " ☽ Last Quarter 3 26 "
10	6.18	5.10	6.34	4.59	6.39	5.7	6.24	5.23	29 " ☉ New Moon 2 31 a.m.
11	6.19	5.9	6.35	4.59	6.39	5.7	6.23	5.23	
12	6.19	5.8	6.35	4.59	6.38	5.8	6.22	5.24	7 July ☾ First Quarter 6 25 a.m.
13	6.20	5.8	6.36	4.59	6.38	5.8	6.21	5.24	14 " ○ Full Moon 7 48 "
14	6.21	5.7	6.36	4.59	6.38	5.9	6.21	5.25	20 " ☽ Last Quarter 10 2 p.m.
15	6.21	5.7	6.36	4.59	6.38	5.9	6.20	5.25	28 " ☉ New Moon 5 17 "
16	6.22	5.6	6.37	5.0	6.37	5.10	6.19	5.26	
17	6.22	5.6	6.37	5.0	6.37	5.10	6.18	5.26	5 Aug. ☾ First Quarter 7 40 p.m.
18	6.23	5.5	6.37	5.0	6.37	5.11	6.17	5.27	12 " ○ Full Moon 2 59 "
19	6.23	5.5	6.37	5.0	6.37	5.11	6.16	5.27	19 " ☽ Last Quarter 7 25 a.m.
20	6.24	5.4	6.38	5.0	6.36	5.12	6.15	5.28	27 " ☉ New Moon 8 59 "
21	6.25	5.4	6.38	5.1	6.36	5.12	6.14	5.28	
22	6.25	5.3	6.38	5.1	6.35	5.13	6.13	5.29	
23	6.26	5.3	6.38	5.1	6.35	5.13	6.12	5.29	
24	6.26	5.2	6.39	5.1	6.34	5.14	6.11	5.30	
25	6.27	5.2	6.39	5.1	6.34	5.14	6.10	5.30	
26	6.28	5.1	6.39	5.2	6.34	5.15	6.9	5.31	
27	6.28	5.1	6.39	5.2	6.33	5.15	6.8	5.31	
28	6.29	5.1	6.39	5.3	6.32	5.16	6.7	5.31	
29	6.29	5.1	6.39	5.3	6.32	5.17	6.6	5.32	
30	6.30	5.0	6.40	5.3	6.31	5.17	6.5	5.32	
31	6.30	5.0	...	...	6.31	5.18	6.4	5.33	

The Markets.

PRICES FOR FRUIT—ROMA-STREET MARKETS.

Article.	MARCH.	
	Prices.	
Apples (Eating), Imported, per quarter-case	8s. to 10s.	
Apples, New England, per packer	...	
Apples, Cooking, per case	8s. to 9s.	
Apricots, Local, per packer	...	
Bananas, Fiji, per case	...	
Bananas, Fiji, per bunch	...	
Bananas, Queensland, Sugar, per dozen	2½d.	
Bananas, Queensland, Cavendish, per dozen	3d.	
Cocoanuts, per dozen	2s. 6d.	
Custard Apples, per quarter-case	3s. 6d. to 4s. 3d.	
Grapes, per lb.	...	
Lemons (Lisbon), per case	4s. to 6s.	
Lemon, rough, per case	...	
Mandarins, per case	3s. 6d. to 4s.	
Nectarines, per box	...	
Oranges, per case	3s. 6d. to 5s. 6d.	
Passion Fruit (Local), per quarter-case	5s.	
Papaw Apples, per quarter-case	...	
Peaches, per quarter-case	...	
Persimmons, per case	9s. 6d.	
Pears, per quarter-case	6s. to 7s. 6d.	
Piemelons, per dozen	2s. 6d.	
Pineapples (Queensland), Queen, per dozen	...	
Pineapples (Queensland), rough, per dozen	6d. to 4s.	
Pineapples (Queensland), smooth, per dozen	1s. 6d. to 8s.	
Plums, per quarter-case	...	
Quinces, per gin case	...	
Rockmelons, Local, per gin case	...	
Tomatoes, Local, per box	5s. to 5s. 9d.	
Watermelons, Local (large), per dozen	...	
Watermelons (medium), per dozen	...	
Watermelons (small), per dozen	...	

SOUTHERN FRUIT MARKET.

Bananas, Fiji, per case	14s. 6d. to 15s. 6d.
" " per bunch	5s. to 10s.
" Queensland, per case	12s. 6d. to 13s.
" " per bunch... ..	4s. to 6s. 6d.
Cocoanuts, per bag	...
" per dozen	...
Mandarins, Fiji, per double case	17s. 6d.
Oranges, American Navel, per case	...
Oranges, common, choice, per case	...
Oranges, medium, per case	...
Passion Fruit, per quarter-case	6s.
Peaches, Victorian, per box of 7½ dozen	11s.
Peanuts, per lb.	2½d.
Pears, per bushel case	12s. 6d.
Pineapples, Queensland (Queens), per case	5s. to 6s.
Pineapples, Queensland (common), choice, per case	6s. to 7s.
Pineapples, Queensland, medium, per case	4s. to 4s. 6d.
Persimmons, per case	5s. 6d.
Pomegranates, per case	4s. 6d.
Rockmelons, per gin case	4s. 6d.
Tomatoes, per box	5s.

The wharf labourers' strike has, it is stated, disorganised the interstate fruit trade.

Orchard Notes for June.

By ALBERT H. BENSON, M.R.A.C.

THE SOUTHERN COAST DISTRICTS.

The notes of last month referring to the care to be taken in the handling and marketing of all kinds of citrus fruits apply with equal force during this and subsequent months till the end of the season.

Keep the orchard clean and work the land to retain moisture. The handling of the citrus crop is the main work in many orchards, but, where slowly-acting manures are to be given, their application should not be later than this month. They should be well mixed with the soil, so that, when the spring comes and the trees start a fresh growth, a certain percentage of plant food will be available for the tree's use. Heavy pruning should be done now whilst the trees are dormant. All large limbs should be cut off close to the main stem, the edges of the cuts should be carefully trimmed, and the whole wound, if of large size, covered with paint or grafting wax, so that it will not start to decay, but soon grow over. When the soil of the orchard is becoming deficient in organic matter, the growing of a winter green crop, such as mustard or rape, is well worth a trial. Clear the crop of fruit from the part of the orchard to be so treated. Plough the land well, work the soil down fine, so as to get a good seed bed, and broadcast the mustard or rape. A manuring of 4 cwt. of meatworks manure and 1 cwt. of sulphate of potash per acre will produce a very heavy crop of green manure, and the plant food not required for the production of such crop will be still available for the trees' use in spring.

Pineapples and bananas should all be cleaned up, and the land got into first-class order. Pineapples, where at all liable to frost, should be covered with grass or other suitable material. The growth of weeds between the rows of pines on land liable to frost is one of the best ways of encouraging frost, as frost will strike dirty, weedy ground and injure the pines growing thereon severely, when it will do little, if any, damage where the land is kept perfectly clean: another advantage of cleanliness in cultivation.

TROPICAL COAST DISTRICT.

Keep the land well cultivated; plough where necessary to bury weed growth, and get the surface of the ground into a state of thorough tilth, as moisture must be retained in the soil by cultivation to mature the spring crop of fruit. This applies not only to oranges and other tree fruits but to bananas and pines as well. A good start in spring means good bunches of bananas and early ripening pineapples. Heavy pruning can be done now in the case of all trees not carrying a heavy crop of fruit, but where citrus trees are heavily loaded the pruning should be put off till after the spring crop of fruit has been gathered. The spraying of the trunks and inside of the trees with the lime and sulphur wash can be carried out, and where Maori is making its appearance the sulphide of soda wash should be used as well.

SOUTHERN AND CENTRAL TABLELANDS.

The pruning of all kinds of deciduous fruit trees is the chief work of the month in the Stanthorpe district. Do not be frightened to prune severely—first, in the case of young trees, so as to get strong well-grown trees instead of straggling top heavy trees; and, second, in the case of trees that are going off in the size and quality of their fruit. Where peaches, apricots, plums, or

nectarines are only making very little new growth, and that weak, so that the fruit produced thereon is small, it is advisable to head the tree hard back, so that it will throw out some vigorous branches in spring that will form a new head for the tree. Apples as well as plums and apricots are sometimes inclined to over-produce fruit spurs, which become long and straggling, and bear a large quantity of small-sized fruit. A vigorous shortening back and cutting out of such spurs will have a very beneficial effect on the quality and size of the fruit produced.

Gather and burn all prunings, and where codlin moth is present in the orchard examine the tree carefully when pruning it, so as to see if there are any cracks, crevices, or masses of loose bark in or under which the larvæ of the moth may be hibernating. All larvæ so found should be destroyed, and if the work is carried out systematically it will tend to materially decrease the crop of moths that will hatch out the following spring. As soon as any part of the orchard is pruned, gather up the prunings and work the land, as a thorough winter weathering of the soil is very beneficial in its effects, and, further, it will tend to destroy many insects that may be wintering in it. The planting of new orchards or of trees to replace any that may have died or that have been found to be unsuitable to the district may be continued during the month and right on till the end of winter.

Do not prune vines in the Stanthorpe district, as it is advisable to leave the pruning as late as possible, but vine pruning can be done at any time now in the Roma or Central district. Tree pruning can be continued during the month, and the orchard should be kept well worked. Citrus fruits can be marketed. Lemons should be gathered and cured.

Farm and Garden Notes for June.

FIELD.—Winter begins on the 24th of this month, and frosts will already have been experienced in some of the more exposed districts of the Southern coast and on the Darling Downs. Hence, insect pests will, to a great extent, cease from troubling and weeds will also be no serious drawback to cultivation. The month of June is considered by the most successful lucerne-growers to be the best time to lay down this crop, as any weeds which may spring up in the event of a dropping season will be so slow-growing that the young lucerne plants will not be choked by them. The land should now be got ready for millets, sorghum, panicum, &c. Oats, barley, vetches, clover, tobacco, buckwheat, field carrots, and swedes may now be sown. Some advocate the sowing of early maize and potatoes during this month; but, obviously, this can only apply to the more tropical parts of Queensland. The land may be got ready, but in the Southern districts and on the tableland neither maize nor potatoes should be planted before August, or at the earliest in warm, early districts at the end of July. There is always almost a certainty of frosts more or less severe during these months. Arrowroot will be nearly ready for digging, but we would not advise taking up the bulbs until the frosts of July have occurred. Take up sweet potatoes, yams, and ginger. Should there be a heavy crop, and, consequently, a glut in the market, sweet potatoes may be kept by storing them in a cool place in dry sand, taking care that they are thoroughly ripe before digging. The ripeness may be known by the milky juice of a broken tuber remaining white when dry. Should the juice turn dark, the potato is unripe, and will rot or dry up and shrivel in the sand pit. Before pitting, spread the tubers out in a dry barn, or in the open if the weather be fine. In pitting them or sorting them in hills, lay them on a thick layer of sand. Then pour dry sand over them till all the crevices are filled and a layer of sand is formed above them. Then put down another layer of tubers, and repeat the process until the hill is of the requisite size. The sand excludes the air, and the potatoes will keep right through the winter. Late wheat may still be sown, but it is too late for a field crop of onions. In tropical Queensland, the bulk of the coffee crop should be off by the end of July. Yams may be unearthed. Cuttings of cinnamon and kola nut tree may be made, the cuttings being planted under bell glasses. Collect divi-divi pods and tobacco leaves. English potatoes may be planted. The opium poppy will now be blooming and forming capsules. Gather til-seed (sesame), and plant out young tobacco plants if the weather be suitable. Sugar-cane cutting may be commenced. Keep the cultivator moving amongst the pineapples. Gather all ripe bananas. Fibre may be produced from the old stems. A hand machine for this purpose has just been introduced into Queensland from France, which will turn out 65 lb. of clean fibre in a day of ten hours. The agent for the machines is Mr. A. Robinson, Civil Service Stores, Brisbane, and the price, we are informed, is £7 10s.

KITCHEN GARDEN.—Cabbage, cauliflower, and lettuce may be planted out as they become large enough. Plant asparagus and rhubarb in well-prepared beds in rows. In planting rhubarb, it will probably be found more profitable to buy the crowns than to grow them from seed, and the same remark applies to asparagus.

Sow cabbage, red cabbage, peas, lettuce, broad beans, carrots, radish, turnip, beet, leeks, and herbs of various kinds, such as sage, thyme, mint, &c. Eschalots, if ready, may be transplanted, also horse radish can be set out now.

The earlier sowings of all root crops should now be ready to thin out, if this has not been already attended to.

Keep down the weeds among the growing crops by a free use of the hoe and cultivator.

The weather is generally dry at this time of the year, so the more thorough the cultivation the better for the crops.

Land for early potatoes should now be got ready by well digging or ploughing.

Tomatoes intended to be planted out when the weather gets warmer may be sown towards the end of the month in a frame where the young plants will be protected from frost.

FLOWER GARDEN.—No time is now to be lost, for many kinds of plants need to be planted out early to have the opportunity of rooting and gathering strength in the cool moist spring time to prepare them for the trial of heat they must endure later on. Do not put your labour on poor soil. Raise only the best varieties of plants in the garden; it costs no more to raise good varieties than poor ones. Prune closely all the hybrid perpetual roses, and tie up, without pruning, to trellis or stakes, the climbing and tea-scented varieties, if not already done. These and other shrubs may still be planted. See where a new tree or shrub can be planted; get these in position; then they will give you abundance of spring bloom. Renovate and make lawns, and plant all kinds of edging. Finish all pruning. Divide the roots of chrysanthemums, perennial phlox, and all other hardy clumps; and cuttings of all the summer bedding plants may be propagated.

Sow first lot, in small quantities, of hardy and half-hardy annuals, biennials, and perennials, some of which are better raised in boxes and transplanted into the open ground, but many of this class can, however, be successfully raised in the open border if the weather is favourable. Antirrhinum, carnation, picotees, dianthus, hollyhock, larkspur, pansy, petunia, *Phlox Drummondii*, stocks, wallflower, and zinnias, &c., may be sown either in boxes or open beds; mignonette is best sown where it is intended to remain.

To grow these plants successfully, it is only necessary to thoroughly dig the ground over to a depth of not less than 12 inches, and incorporate with it a good dressing of well-decayed manure, which is most effectively done by a second digging; the surface should then be raked over smoothly, so as to remove all stones and clods, thus reducing it to a fine tilth. The seed can then be sown in lines or patches as desired, the greatest care being taken not to cover deeply; a covering of not more than three times the diameter of larger seeds, and a light sprinkling of fine soil over small seeds, being all that is necessary. A slight mulching of well-decayed manure and a watering with a fine-rosed can will complete the operation. If the weather prove favourable, the young seedlings will usually make their appearance in a week or ten days; thin out so as to leave each plant (if in the border) at least 4 to 6 inches apart.

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NOTICE.

Queensland Agricultural Journal.

It is hereby notified that the *Journal* will be supplied to all members of Agricultural and Horticultural Societies who do not derive their livelihood solely from the land, on payment, in advance, of an annual subscription of 5s., which will include postage. Schools of Arts will be supplied at the same rate.

Persons resident in Queensland whose main source of income is from Agricultural, Pastoral, or Horticultural pursuits, which fact should be stated on the attached Order Form, will receive the *Journal* free

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For your convenience an Order Form is attached. A cross on each side of the Order Form indicates to the recipient that his subscription is again due.

Amount of one year's subscription should therefore be forwarded with Order Form, without delay, to the UNDER SECRETARY, Department of Agriculture and Stock, Brisbane.

All subscriptions received for the *Journal* after the seventh day of the month will commence with the month after that on which payment is received. Previous copies available will be supplied at 6d. per copy.

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Agriculture.

THE LOGAN FARMING AND INDUSTRIAL ASSOCIATION, BEENLEIGH.

REPORT FOR 1907.

The hon. secretary of the above association has kindly supplied us with the following very satisfactory report of the operations of the association for the year 1907:—

FINANCE.

The income was £105, and the expenditure £88, leaving a balance of £17 to credit.

MEMBERS.

The membership was sixty-seven, being an increase of eleven on the previous year; fourteen council meetings were held, the average attendance being eleven members.

MARKET.

Rents received from the South Brisbane Farmers' Market show a decrease of £7. The farmers attending are well satisfied, and sell out in the course of a few hours. It is to be regretted that a larger number do not take advantage of the opportunity thus offered to dispose of their products direct to the consumer. The public give a fair measure of support to the market, and undoubtedly, if more farmers and market gardeners attended, they would find a good demand for their produce.

DISTRICT EXHIBIT.

It was not deemed advisable by my council to forward an exhibit last year to the National Association Show, at Bowen Park, but an effort will be made to be represented at the coming show in August next, and I have no doubt a renewed and enthusiastic interest once aroused will result in a display that will prove a credit to the Logan and Albert districts.

BUTTER FACTORY.

It is matter for congratulation that the butter factory at Kingston, initiated by this association, is proving a success and creditable to the district. During the seven months which it has been working, it has succeeded in making a name for itself, owing to the high-class butter it is turning out—butter which gained the championship for Queensland and the second place in the competition at the late Melbourne Exhibition for the championship of Australia. The factory was opened on the 13th May, 1906. The output for the first month was 10 tons of butter. The cream suppliers numbered 120. During December, the output was 10 tons per week, and cream suppliers totalled 260. It is hoped that the work of co-operation will continue, and that a bacon factory will be established in this district, there being, I believe, an opening for that industry.

STOCK.

The association has succeeded in introducing pure bred bulls into the district, and it is hoped that the results will prove beneficial to the small dairy farmers, in whose interests the matter was taken up. The system of supplying members on liberal terms has proved a success. We trust that the association will receive the measure of support it undoubtedly deserves by drawing new members to itself and in gaining their confidence and support during 1908.

EXPENDITURE AND RETURNS IN CONNECTION WITH IRRIGATION WORK AT QUEENSLAND AGRICULTURAL COLLEGE.

In connection with the following statement, the Principal of the Agricultural College points out that the work was conducted during a dry period, and the crops were harvested when the price of produce was high. The price set against crops was the market value at the time of reaping. The height to which it was necessary to raise the water, together with the cost of fuel, made the irrigation somewhat expensive.

No engineer was employed in connection with the machinery, except to effect some slight repairs which from time to time became necessary.

I. Crop—Oats. Area—30 acres.

EXPENDITURE.

Application of water—	£	s.	d.	£	s.	d.
1 man, 41 $\frac{1}{4}$ days, at 5s. ...	10	6	3			
4 students, 41 $\frac{1}{4}$ days, at 1s. 4d. ...	11	0	0			
1 horse, 13 $\frac{1}{2}$ days, at 2s. ...	1	7	0			
				22	13	3
Cutting and carting firewood—						
2 men, 17 days, at 5s. ...	8	10	0			
2 students, 17 days, at 1s. 4d. ...	2	5	4			
2 horses, 17 days, at 2s. ...	3	8	0			
				14	3	4
Coal—						
15 tons 18 cwt., at 7s. 6d. per ton, f.o.b. ...	5	19	3			
Freight on above, at 5s. 9d. per ton ...	4	11	5			
Cartage from Gatton, at 3s. per ton ...	2	7	8			
				12	18	4
Total expenditure ...				£49	14	11

RETURNS.

	£	s.	d.
Green oats, 41 tons 12 cwt., at £1 10s. per ton ...	62	8	0
Oaten hay, 30 tons, at £6 10s. per ton ...	195	0	0
Total value of crops ...	£257	8	0

Net return from irrigation, £207 13s. 1d.

II. Crop—Lucerne. Area—15 acres.

EXPENDITURE.

Application of water—	£	s.	d.	£	s.	d.
1 man, 7 $\frac{3}{4}$ days, at 5s. ...	1	18	9			
4 students, 20 $\frac{1}{2}$ days, at 1s. 4d. ...	5	9	4			
1 horse, 9 $\frac{1}{2}$ days, at 2s. ...	0	19	0			
				8	7	1
Cutting and carting wood—						
2 men, 8 days, at 5s. ...	4	0	0			
2 students, 8 days, at 1s. 4d. ...	1	1	4			
2 horses, 8 days, at 2s. ...	1	12	0			
				6	13	4
Coal—						
7 tons 5 cwt., at 7s. 6d. per ton, f.o.b. ...	2	14	4			
Freight on above, at 5s. 9d. per ton ...	2	1	8			
Cartage from Gatton, at 3s. per ton ...	1	1	9			
				5	17	9
Total expenditure ...				£20	18	2

RETURNS.		£	s.	d.
Green lucerne, 17 tons 5 cwt., at £1 10s. per ton ...	...	25	17	6
Lucerne hay, 10 tons at £7 per ton ...	...	70	0	0
Total value of crop ...	...	£95 17 6		

Net return from irrigation, £74 19s. 4d.

Irrigation was commenced at the end of August, 1907, and carried on throughout September, October, and the early part of November.

With reference to the above particulars of the irrigation experiments at the Queensland Agricultural College, Gatton, the Principal of the College, Mr. John Mahon, points out that very few districts in Queensland afford better facilities for an irrigation scheme than the Lockyer. The water of Lockyer Creek, when supplied to the land under properly controlled conditions, has no injurious effect on the soil or the growth of vegetation. There is a natural fall from the banks of the creek on both sides, which means that the cost of distributing the water would not be great. Weirs could be placed in the creek at various distances apart, and thousands of acres irrigated at a small cost. This would be the means of increasing the value of the land by at least 20 per cent.

RESULTS FROM STRIPPING EXPERIMENTS.

By C. F. ECKART,

Director, Division of Agriculture and Chemistry, Honolulu, Hawaii.

In June, 1906, a bulletin (No. 16), entitled "The Influence of Stripping on the Yields of Cane and Sugar," was published by this division of the Experiment Station, and data were presented showing the relative yields obtained from stripped and unstripped cane in three series of experiments. In this bulletin (No. 25) the results from the ratoon crop of the second series of tests are given along with the results derived from the plant crop. This bulletin is, therefore, supplementary to Bulletin No. 16, and considers the yields of cane and sugar from two crops on fourteen plats in the station field.*

The plant cane (Lahaina) was planted in June, 1904, and harvested during the last of February and the 1st of March, 1906. It was stripped three times, as follows:—

1st stripping—25th January, 1905.

2nd „ 2nd June, 1905.

3rd „ 1st November, 1905.

The ratoons were cut back in July, 1906, and harvested in January, 1908.

Stripping was performed on the following dates:—

1st stripping—6th March, 1907.

2nd „ 15th July, 1907.

3rd „ 20th October, 1907.

Each plat consisted of four rows, 50 feet in length, the two middle rows forming the bases of the comparisons; one of these test rows was stripped, and the other was left unstripped.

* This Bulletin (16) will be found reprinted in the "Q.A.J.," Vol. XVII., page 237.
See also "Q.A.J.," Vol. XIX., page 36, on "Stripping Sugar-cane."—Ed. "Q.A.J."

With the exception of Plat No. 1, which was not fertilised, all of the cane received the same mixed fertiliser, divided up into different proportions for the several applications, some of the plats receiving supplementary quantities of nitrate of soda, as was described in Bulletin No. 16, page 6. This explains the variation in the yields from different plats, since the tests were planned to cover both fertilisation and stripping. Owing to the fact that the stripped and unstripped rows in each plat were immediately adjoining, the yields from these rows are comparable, and the average results from the fourteen plats afford positive conclusions with respect to stripping at the experiment station. The fertiliser experiments are inconclusive, and will be repeated on plantation sub-stations in accordance with the system of long, contiguous plats adopted by the division for reasons given in Circular No. 6, page 42.

The following tables show the yields of cane and available sugar, together with the quality of the juices, from stripped and unstripped rows in fourteen plats for two crops of cane:—

WEIGHT OF CANE PER ACRE—TONS.

Plat.	PLANT CANE.		RATOONS.		AVERAGE.	
	Stripped.	Not Stripped.	Stripped.	Not Stripped.	Stripped.	Not Stripped.
1	93.31	90.52	57.49	71.22	75.40	80.87
2	64.73	88.34	49.09	59.72	56.91	74.03
3	71.09	98.01	48.78	67.69	59.93	82.85
4	91.78	108.33	58.45	65.99	75.11	87.16
5	67.00	111.25	56.27	64.86	61.63	88.05
6	82.55	112.21	64.73	72.04	73.64	92.12
7	73.57	97.88	62.90	62.33	68.23	80.10
8	72.22	99.49	53.97	74.79	63.09	87.14
9	78.10	91.30	63.33	80.89	70.71	86.09
10	76.27	101.93	57.62	74.74	66.94	88.33
11	64.29	97.36	56.32	77.49	60.30	87.42
12	84.16	111.82	70.13	82.15	77.14	96.98
13	67.08	94.09	60.02	81.67	63.55	87.88
14	84.51	108.38	74.61	89.69	79.56	99.03
Average ...	76.47	100.78	59.55	73.23	68.01	87.00

ANALYSIS OF JUICES.

Plat.	BRIX.				SUCROSE.				PURITY.			
	PLANT, 1904-6.		RATOONS, 1906-8.		PLANT, 1904-6.		RATOONS, 1906-8.		PLANT, 1904-6.		RATOONS, 1906-8.	
	Stripped.	Not Stripped.	Stripped.	Not stripped.	Stripped.	Not Stripped.	Stripped.	Not Stripped.	Stripped.	Not stripped.	Stripped.	Not stripped.
1	21.1	21.1	19.7	20.4	19.1	19.2	17.6	18.5	90.6	90.7	89.3	90.7
2	19.6	20.0	18.6	19.7	18.0	18.3	16.5	17.6	91.7	91.1	88.7	89.3
3	19.2	19.4	18.4	19.4	17.4	17.7	16.4	17.0	90.6	90.9	89.1	87.6
4	19.3	19.8	17.8	18.7	17.4	18.0	15.6	16.3	90.2	90.9	87.6	87.2
5	16.7	19.2	17.8	18.8	14.7	17.3	15.5	16.5	87.6	90.1	87.1	87.8
6	18.8	19.0	17.5	18.4	16.9	17.1	15.2	16.1	89.4	89.7	86.9	87.5
7	17.6	18.5	17.9	18.8	15.4	16.5	15.3	16.4	87.5	88.9	85.5	87.2
8	19.0	18.9	18.1	19.3	16.9	16.9	15.8	17.0	88.6	89.5	87.3	88.1
9	19.5	20.5	18.5	19.2	17.7	18.7	16.4	17.1	90.6	91.0	88.6	89.0
10	19.4	19.6	18.2	19.6	17.4	17.7	16.0	17.4	89.8	90.4	87.9	88.8
11	17.6	19.8	18.6	18.6	15.7	17.8	16.1	16.4	88.7	90.2	86.6	88.2
12	19.4	19.9	18.0	19.0	17.4	18.0	15.3	16.5	89.6	90.3	85.0	86.8
13	17.7	19.3	18.1	18.4	15.6	17.4	15.2	15.9	88.1	90.0	84.0	86.5
14	18.1	19.7	17.7	18.9	15.7	17.8	15.1	16.6	87.1	90.1	85.3	87.8
Averages ...	18.8	19.6	18.2	19.0	16.8	17.7	15.8	16.8	89.3	90.3	87.0	88.0

GLUCOSE AND GUMS OF JUICE, AND FIBRE PER CENT. CANE.

Plat.	GLUCOSE.				GUMS.				FIBRE % CANE.			
	PLANT.		RATOONS.		PLANT.		RATOONS.		PLANT.		RATOONS.	
	Stripped.	Not Stripped.	Stripped.	Not Stripped.	Stripped.	Not Stripped.	Stripped.	Not Stripped.	Stripped.	Not Stripped.	Stripped.	Not Stripped.
1	28	34	47	40	33	44	17	20	10.1	11.5	10.25	9.25
2	30	32	54	43	34	44	24	16	10.5	11.5	10.75	10.98
3	41	37	56	43	40	47	23	16	10.3	11.4	11.25	10.00
4	43	32	66	60	38	45	32	18	11.1	10.3	10.00	10.50
5	69	43	66	58	34	44	10	10	11.5	10.0	11.22	9.25
6	56	42	72	66	44	41	06	08	11.0	11.4	10.00	9.00
7	64	67	71	62	36	38	14	20	10.0	11.0	10.25	11.00
8	57	55	64	52	40	43	23	23	11.6	11.5	10.75	10.00
9	39	37	59	55	39	44	19	20	11.4	10.9	10.50	11.43
10	50	51	66	56	35	44	20	22	10.3	11.6	10.25	10.00
11	50	40	63	61	46	44	20	21	11.7	11.1	9.50	9.75
12	48	40	77	50	38	43	20	21	10.4	11.0	9.25	12.50
13	57	41	77	74	43	41	21	20	11.1	11.0	10.75	11.00
14	57	45	88	69	42	46	19	20	10.5	10.9	11.00	10.5
Averages	49	42	66	56	38	43	19	18	10.8	11.1	10.40	10.36

WEIGHT OF AVAILABLE SUGAR—TONS.

Plat.	PLANT, 1904-6.		RATOONS, 1906-8.		AVERAGE.	
	Stripped.	Not Stripped.	Stripped.	Not Stripped.	Stripped.	Not Stripped.
1	14.54	14.17	8.19	10.73	11.36	12.45
2	9.55	13.20	6.53	8.51	8.04	10.80
3	10.12	14.17	6.47	9.23	8.29	11.70
4	13.05	15.94	7.31	8.61	10.18	12.27
5	7.90	15.69	6.97	8.59	7.43	12.14
6	11.29	15.59	7.86	9.29	9.57	12.44
7	9.10	13.03	7.63	8.20	8.36	10.61
8	9.84	13.69	6.82	10.22	8.33	11.95
9	11.20	13.95	8.37	11.18	9.78	12.56
10	10.79	14.72	7.40	10.49	9.09	12.60
11	8.14	14.15	7.23	10.22	7.68	12.18
12	11.89	16.43	8.48	10.82	10.18	13.62
13	8.42	13.34	7.16	10.35	7.79	11.84
14	10.66	15.88	8.92	11.95	9.79	13.91
Average	10.46	14.56	7.52	9.88	8.99	12.21

Nothing in the way of an experiment could offer more convincing proof than these figures that stripping causes an enormous loss under such conditions as obtain at the experiment station. In condensed form the data may be presented as follows:—

WEIGHT OF CANE. TONS PER ACRE.

	Stripped.	Not Stripped.
Plant Cane	76.47	100.78
Ratoons	59.55	73.23
Average	68.01	87.00

SUCROSE IN JUICE. PER CENT.

	Stripped.	Not Stripped.
Plant Cane	16.8	17.7
Ratoons	15.8	16.8

PURITY IN JUICE.

	Stripped.	Not Stripped.
Plant Cane	89.3	90.3
Ratoons	87.0	88.0

AVAILABLE SUGAR PER ACRE. TONS.

		Stripped.		Not Stripped.
Plant Cane	...	10.46	...	14.56
Ratoons	...	7.52	...	9.88
Average	...	8.99	...	12.21

The accompanying photograph shows the relative quantities of dead cane from the stripped and unstripped rows. It would appear from the illustration that there were twice as many dead stalks where the cane was stripped than where it was left unstripped, but the difference in the size of the piles is due to some extent to the larger number of large sticks in the stack of stripped rotten cane. Where the cane was not stripped, the dead canes which were found in the rows were chiefly those that had died off when quite small; where the cane was stripped, dead sticks of all sizes were found, from young shoots to stalks which had almost reached maturity. The number of dead canes per acre are given in the following table:—

NUMBER OF DEAD CANES PER ACRE.

Plat.	PLANT CANE.		RATOONS.		AVERAGE.	
	Stripped.	Not Stripped.	Stripped.	Not Stripped.	Stripped.	Not Stripped.
1	2,788	4,530	5,227	4,179	4,007	4,354
2	5,401	4,879	7,492	3,310	6,446	4,091
3	5,750	2,614	9,234	6,795	7,492	4,704
4	5,053	2,265	10,454	4,356	7,753	3,310
5	9,060	3,485	7,492	10,280	8,276	6,882
6	5,227	2,439	8,189	9,583	6,708	6,011
7	8,886	7,144	9,757	9,234	9,321	8,189
8	5,227	3,833	8,015	7,143	6,621	5,488
9	6,098	3,659	9,757	6,795	7,927	5,227
10	7,841	3,833	10,628	9,060	9,234	6,446
11	6,447	5,227	9,757	7,840	8,102	6,533
12	5,924	3,659	7,840	6,446	6,882	5,052
13	9,235	4,879	7,492	5,924	8,363	5,401
14	8,189	3,136	8,015	8,015	8,102	5,575
Average ...	6,509	3,970	8,525	7,068	7,516	5,519

The data contained in this bulletin, together with that presented in Bulletin No. 16, show clearly the importance of carrying out accurate tests, with respect to stripping, on the plantations. If it should be found that the practice of removing the dead leaves from the cane results, on the average, in a tithe of the percentage of loss which occurs in the experiment station field, the decreased yields from stripping would represent for the Islands an almost incredible figure. Last year on the Island of Oahu alone, approximately 90,158 tons of sugar were obtained from stripped cane. If we could say that the average percentage of loss from stripping for the Island of Oahu was only one-half that at the experiment station, then the loss for last crop would have been approximately 1,210,350 dollars. This figure does not take into consideration the cost of stripping, but is based entirely on the yields of sugar. As far as I am able to learn, 323,800 tons of sugar were obtained from stripped cane on Hawaiian plantations for the crop of 1907. If the average percentage of loss from stripping was one-third of that experienced at the station, this practice cost the plantations in sugar alone, for one year, nearly 3,000,000 dollars.

In carrying out field tests to gauge the economy of stripping in any locality, it is necessary that every possible safeguard to accuracy be observed, and the division would strongly recommend the laying out of experiment areas in accordance with the following plans. These plans call for long, narrow plats. The greater the length of the plats, the more accurate will be the results.

Plate XXVII.



A.
THE PILE MARKED A SHOWS THE QUANTITY OF DEAD CANES TAKEN
FROM 14 STRIPPED ROWS.

B.
THAT MARKED B SHOWS THE DEAD CANES TAKEN
FROM 14 UNSTRIPPED ROWS.

Dairying.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE,
GATTON.

RECORD OF COWS FOR MONTH OF APRIL, 1908.

Number.	Cow's Name.	Breed.	Date of Calving.	Total Milk.	Average Test, Per cent.	Commercial Butter.	Remarks.
				Lb.		Lb.	
1	Hettie ...	Grade-Shorthorn	26 Mar., 1908	833	4.6	42.91	
2	Rhoda ...	" "	31 Mar., "	879	3.8	37.41	
3	Carrie ...	Jersey ...	4 April "	709	4.6	36.52	
4	Mona ...	Grade Holstein	26 Oct., 1907	625	4.9	34.30	
5	Glen ...	Shorthorn	10 Feb., 1908	683	4.1	31.35	
6	Cocoa ...	Jersey ...	20 Nov., 1907	569	4.8	30.58	
7	Cuckoo ...	" ...	4 Mar., 1908	586	4.3	28.22	
8	Winnie ...	Shorthorn	15 April "	470	5.1	26.85	
9	Ivy ...	Jersey ...	5 Feb., "	519	4.9	28.48	
10	Careless ...	" ...	29 Oct., 1907	447	5.4	27.03	
11	Honeycomb	Shorthorn	23 Aug. "	469	5.0	26.26	
12	Laura ...	Ayrshire	20 May "	502	4.6	25.86	
13	Comet ...	Grade-Holstein	23 Aug. "	411	5.5	25.31	
14	Beauty ...	Ayrshire	21 Dec. "	609	3.7	25.24	
15	Graceful ...	Grade-Shorthorn	8 Jan. "	441	5.0	24.69	
16	College Lass	Ayrshire...	1 Sept. "	473	4.8	24.43	
17	Dora ...	Shorthorn	9 Sept. "	504	4.2	23.71	Slipped calf.
18	Clare ...	Jersey ...	21 Aug. "	350	6.0	23.52	
19	Poppie ...	Jersey-Ayrshire	24 Feb. "	344	6.2	23.75	
20	Damsel ...	Holstein ...	19 Feb., 1908	640	3.2	22.93	
21	No. 1 ...	Shorthorn	2 Dec., 1907	481	4.2	22.62	
22	No. 112 ...	Grade Jersey	23 Aug. "	433	4.6	22.30	
23	Linnet ...	Ayrshire	13 Dec. "	467	4.0	20.92	
24	Wonder ...	Shorthorn	"	355	5.6	22.26	

NEW PROCESS OF BUTTER-MAKING.

A VALUABLE DISCOVERY.

Something entirely new in the way of making butter which will keep is promised by M. B. L. Ehrmann, a French chemist. Every person with experience has been disappointed in the quality of butter taken from cold storage. The housewife frequently purchases a few pounds of good butter, possibly when the market price is low, but finds that this butter is scarcely fit for table use in two weeks. Various forms of preservatives, harmless and harmful, have been recommended for keeping butter, but none of them have the property of retaining in butter that delicate aroma which everyone enjoys. The demand is more and more for fresh butter, and it is difficult to sell cold storage goods at all, except in times of scarcity. If Mr. Ehrmann has really discovered a practical method of preserving butter, by a simple, harmless, and inexpensive method, he will have conferred a great benefit on mankind. Briefly, the process consists of blowing carbonic acid gas through the cream, or washing the cream or butter with carbonated water.

The following practical points in the process will be of general interest to readers, as given in the pamphlet received:—

“The quality of butter depends first of all on the quality of the cream, and the cream, during the time it is stored waiting to be manufactured into butter, is subject to many alterations detrimental to the value of the butter produced, and to its keeping qualities. The effect of carbonic acid is to prevent such alterations.

"When pure carbonic acid is used, the butter prepared by my process will retain its sweetness, freshness, and original flavour.

"The cream can be treated in two ways, either by the wet process or by the dry process. For the small farmer, a small cylinder of carbonic acid, with a reducing valve, will be a sufficiently convenient plant."

For the benefit of those not familiar with the nature of liquid carbonic acid, it is as well to mention that it is purchased from manufacturers, who send it out in heavy steel drums. The drums hold from 25 to 50 lb. of the liquid gas, which costs about 10 cents a lb. Such gas is used in the making of "pop," "ginger ale," and all similar soft drinks. The gas is also used in machines for producing refrigeration, and for the manufacture of artificial ice, &c.

According to the directions for using, the cream may be carbonated in the cans or in vats by blowing the gas through the cream, butter, and utensils.

"The quantity of carbonated water to be blown into the cream is about one-fifth of the quantity of the cream. More carbonated water is required in summer, also when the cream has to be sent to a distant place or factory, or has to be kept for a long time before being churned, or when the cream is over-ripe. If the butter has to be sent to a distant market, or to be kept for weeks, more carbonic acid is to be used in the cream.

"The cream can be churned directly after it has been carbonated, or some time afterwards, and the butter is manufactured as usual.

"Carbonated cream keeps sweet longer than non-carbonated cream. It is never desirable to carbonate the milk, as a quantity of carbonic acid would have to be used which is much larger than is required by the cream, and would be subsequently lost in the butter-milk."—"New Zealand T. and C. Life."

SIMPLE REMEDY FOR HOVEN.

A Western farmer, whose cattle were, some four years ago, affected with hoven, mentions how a friend saved the herd. The method was as follows:—Cut pieces of rounded wood (broom-handle is ideal) in lengths sufficient to leave an inch or so on each side of the mouth when the stick is placed between the jaws. Fasten a piece of binder twine or rope on either end and behind the horns, and force the stick well back between the jaws. This causes the animal to endeavour to eject the stick by working the jaws and tongue, producing antiperistaltic action, and the ejection of the gases. In the case in question the effect was magical, for the cattle belched up great quantities of gas, each emission relieving them. The bits were removed when the accumulation of gas ceased. This simple treatment saved the cattle, and no serious effect followed. For the subsequent four years no other treatment for hoven has been used by the farmer.

TO GET RID OF ANTS.

"How can I get rid of ants on the lawn?" asks a correspondent. For that matter, in the house as well. An exchange says the answer is as plain as A, B, C. Go to a druggist, get a pennyworth of carbon sulphide, pour a tablespoonful in the ant hole, cover the hole over with sacking or a bit of oil cloth, so the poisonous fumes will go down to the recess where the ants are holding jubilee over pure food prospects, and the wicked ant will rest from its labours and trouble the lawn no more.

Poultry.

FINAL REPORT ON EGG-LAYING COMPETITION, APRIL, 1907, TO MARCH, 1908, QUEENSLAND AGRICULTURAL COLLEGE.

Our fourth laying competition closed on 31st March. There were twenty-five competing and three College pens, the latter being non-competitive, making up the number to twenty-eight. The total number of eggs laid during the twelve months was 30,543, an average of nearly 1091 per pen, or 181·8 per bird.

FEEDING AND GENERAL MANAGEMENT.—The following method of feeding was followed throughout the competition:—Bran and pollard for the morning meal, in the proportion of 1 part of bran to 2 of pollard (equal parts when the pollard was very floury) mixed with hot water, or soup made from boiling fresh bones, when obtainable, and occasionally separated milk, into a crumbly mass. Every alternative morning a little Sunlight oilcake was mixed with the pollard and bran, the bulk being made the same by the omission of some of the latter ingredients. About a pint of this mash was fed to each pen at 6·30 a.m. At noon, chaffed green lucerne (a good handful to each pen) was fed daily when there was no green grass in the runs, and a little soup meat was fed, when obtainable, twice a week; when this could not be had, it was replaced by $\frac{1}{2}$ -lb. of dried blood mixed in the morning mash, or a handful of poultry food to each pen. The evening feed consisted for the most part of wheat, with, twice a week, good heavy oats or sunflower seed during the summer months, and maize during the winter. The latter three grains were fed by way of variety, but wheat was the staple food; about 1 pint of the above grains was fed to each pen at 4·30 p.m. Shell grit and clean cool water were kept constantly before the birds, and they were at all times fed as much as they would eat up clean. The houses were cleaned out twice a week, and occasionally sprayed with Little's Sheep Dip, 1 pint to a kerosene tin full of water; this was found to be very effective in the case of vermin, and it also acts as a disinfectant.

MORTALITY.—A sharp lookout was always kept for any birds that did not come up for their food, or that were moping about, with the result that only eight birds died during the twelve months, while one became blind. All the above were replaced with the exception of two of Mrs. Mort's Buff Orpingtons, this pen having contained four birds only since the beginning of January. The fault was not ours, as competitors are always at once advised when a bird dies, a telegram being sent in cases where a letter will not arrive within a few hours. If competitors will not replace the birds, they are breaking the rules under which they have entered, the average of the pen and the gross returns are decreased, which is fair neither to the conductors of the competition nor the birds. It is to be hoped that this sort of thing will not occur again.

We had during the year a very large number of visitors to see the birds; many appeared to take a great interest in the competition, which formed an object lesson on utility poultry farming both to the general public and the College students.

SOME OF THE COMPETITORS.—Mr. A. H. Padman's White Leghorns—the winners—are medium-sized birds, very active, and with strong constitutions; the same birds ran right through the twelve months without a day's sickness. They commenced well, with 108 eggs for the first month, and never flagged until the last fortnight. They had good appetities (a very necessary quality for heavy laying), and wound up with a world's record, beating the previous

one by 44 eggs. The second pen—Mrs. Craig's White Leghorns—are somewhat larger birds than the winners; they also went right through the twelve months without death or sickness, and proved themselves to be good doers. They did not get away so well as the winners during the first two months, but afterwards laid remarkably well right to the finish, their total score being 1,432. The third pen—Rosecomb Minorcas, owned by Mrs. Cross—are also splendid layers, very hard, and fair eaters; no deaths or sickness occurred amongst them during the competition. They laid 1,043 eggs during the last eight months, and 1,341 for the whole period. The fourth pen—Mr. Shillig's White Leghorns—also did good work; they were medium-sized birds, but rather small eaters. The Wharepaka White Leghorns also performed creditably, but were sent rather young to put up a first-class performance. Amongst the heavy breeds, the pen of S. L. Wyandottes, owned by Mr. W. Phillips, took the highest place with 1,200 eggs—a very good performance—and they laid consistently throughout. Geo. Robertson's Wyandottes also did remarkably well, considering that they were the smallest eaters in the competition. P. O'Neill's Black Orpingtons are good layers; but, owing to their large size, they took too long to get started; if they had been hatched a month earlier they would have commenced to lay earlier, and would have put up a good total; they laid remarkably well in the spring, but lost too much time through being broody during the summer months.

WARTS ON POULTRY.

Replying to a communication to the Department on the above subject, Mr. M. Fern, Poultry Expert, writes:—

1. Birds suffering from warts should be isolated, and the warts painted with carbolised vaseline or a paste made of sulphur, kerosene, and lard. Mix the sulphur well in with the lard or vaseline, and then add a few drops kerosene. Place Epsom salts in water—1 teaspoonful to quart of water—and give this to all kinds, sick or well, as it cools the blood and prevents attacks of this disease.

2. In the case of the tick, the only way to combat the pest is, after dipping the bird in a weak solution of any good cattle dip, to prevent the ticks from getting on to the bodies of the hens.

The tick harbours in the cracks of the fowlhouses, and comes out of its lair at night and attacks the birds. To prevent this, perches should be swung from the roof of the house, on trestles, the feet of which should be placed in tins containing kerosene, the roosts to be fastened to the top of the trestle, and they must not touch the sides of the house.

The house should be strongly fumigated, and, if procurable, tar should be liberally used on perches and about the house.

ENORMOUS PRICE FOR A PEN OF WHITE ORPINGTONS.

Our illustration of a pen of five beautiful White Orpingtons is taken from the "American Poultry Journal." These birds were originated on the Ernest Kellerstrass Poultry Farm at Dodson, near Kansas City, U.S.A. They were exhibited at the Madison Square Garden Show in January, 1908, and were purchased by Mme. Padarewska, wife of Ignace Jan Padarewski, the celebrated pianist. Mme. Padarewska is a poultry fancier, and at her home in Switzerland is famous as a poultry-rearer. She visited the Kellerstrass Farm, and purchased the birds here depicted for the enormous sum of 7,500 dollars, or

Plate XXVIII.



A VALUABLE PEN OF WHITE ORPINGTONS, FOR WHICH £1,500 WAS PAID.



£1,500 sterling. The following is a fac-simile of her telegram, sent from her Pullman private car *en route* to her home at Morges, in the Canton de Vaud, Switzerland:—

M. Ernest Hollenshaw.
Kansas City, Mo

Dear Sir

Please ship my \$2500
per of Crystal White Dipper
to Hon. Bureau Morges
1500 Vaud, Switzerland, on the
16th of this month
Yours truly
February 1st 1908 Helena Staderewitz

POULTRY EXPERT'S MOVEMENTS.

Mr. M. Fern, Poultry Expert, will visit the following places during the month of June:—

- Gin Gin Show, 2nd and 3rd June.
- Maryborough Poultry Show, 4th, 5th, and 6th June.
- Kilkivan Junction, 7th June.
- Kingaroy Show, 9th to 11th June.
- Gympie district and Woondum, 12th and 13th June.
- Deep Creek, 13th and 14th June.
- Bundaberg Show, 16th, 17th, and 18th June.
- Bundaberg and Woongarra district, 19th and 20th June.

The Orchard.

TROPICAL FRUITS AT ROCKHAMPTON.

We have received from Mr. R. Simmons, Curator of the Rockhampton Botanic Gardens, the photograph, here reproduced, of the jackfruit-tree (*Artocarpus integrifolia*) growing in the gardens. The tree is large-foliaged, an evergreen, which thrives particularly well in the Rockhampton district. It bears its fruit upon the stem and thicker branches. The fruit, when quite ripe, has a rather strong odour, which is disliked by some at first, but one soon gets accustomed to it. Besides, if the fruit is opened and allowed to stand for a short time before eating, the smell, which is not shared by the edible part, disappears. The tree is very prolific, being seldom without fruit. Another fruit which thrives well in the gardens is the Alligator Pear (*Persea gratissima*). One of the trees there is about twenty-three years old, and thrives well. It is a fairly large tree, evergreen, with oblong leaves of a bright green colour. The fruit, which is borne on the ends of the branches, has the appearance of a large pear, and weighs up to $2\frac{1}{2}$ lb. It has a rich buttery flesh of a greenish-yellow colour, with a walnut flavour, so rich that many people make use of some condiment with it, such as pepper, salt, vinegar, wine, limejuice, or sugar. The soil in which the tree is growing in the gardens is of a sandy nature, about 4 feet deep, which has had one good dressing of manure in five years. Like the jack-tree, it requires no pruning other than keeping dead wood cut out. During long spells of dry weather it was watered about once a fortnight.

PICKLING OLIVES FOR HOME USE.

The growing of olives in Queensland, although long past the experimental stage, has not been prosecuted with the vigour which the great value of the fruit, both as an oil-producer and as pickled fruit, entitles it to. Wherever olive trees have been planted in this State they have thriven remarkably well, and have borne heavy crops of fruit, notwithstanding abuse and neglect. No better proof of the suitability of the Queensland climate for olive-growing can be given than the plantation at St. Helena Penal Establishment, in Moreton Bay. Many of the older trees on the island are of enormous size, and numbers of other trees planted on the slope of the hill have reached the bearing stage. The tree can withstand severe drought, and yet responds splendidly to good treatment, abundance of water, and culture. Writing on the olive in his pamphlet on "The Fruits of Queensland," Mr. A. H. Benson says:—

"A much-neglected fruit in this State, as it is also in most English-speaking countries. Few English people are fond of either the fruit or the oil, and yet it is probable that there is no tree that for the space it occupies will produce a greater annual return of food than the olive. A number of trees are scattered throughout the State, some of which are now of large size and fair age, but, so far, practically nothing beyond making a few gallons of oil and pickling a few gallons of fruit has been attempted, and this only in a purely experimental manner.

"The present condition of the olive industry is destined to have a wakening up ere long, as a country that can produce this fruit in such quantities and of such a quality as the lighter soils of the Darling Downs is destined some day to be one of the largest producers of olives on earth. Some years since I planted a number of the best varieties of olives—tree obtained direct from

Plate XXIX.



JACK FRUIT TREE, IN THE BOTANICAL GARDENS, ROCKHAMPTON.



JACK FRUIT—HALF NATURAL SIZE. WEIGHT, 19 LB. 10 OZ.

California—on the Darling Downs, in land that I considered suitable for their growth, and which was properly prepared prior to planting. The trees here have made a really phenomenal growth, they came into bearing within three years of planting, and have borne steadily ever since. They have proved enormous bearers, and an experimental crushing showed that the oil was of high quality.

“There are large areas of similar country to that in which they are planted in different parts of the State, and I feel certain that this really valuable food fruit is bound some day to be a considerable source of our national wealth. So far, the drawback to the growth of olives has been the cost of gathering the fruit and the limited demand for the oil or pickled fruit, but against this, it has many advantages, one, and by no means the least, of which is, its value as a shade and shelter tree on our open treeless plains. It is also a very hardy tree, withstanding drought well, and thriving in land that is too stony for the cultivation of ordinary farm crops. It is a healthy tree, free from most fruit pests other than the olive scale, which can be kept in check by spraying or cyaniding; and last, but not least, it is an ornamental tree whose wood is of considerable value. The olive does best with us in loamy soils of fair depth and basaltic origin, that are moderately rich in lime and potash, and have a fair drainage. A subsoil of decomposed rock answers well. It will, however, do on several other kinds of soil, but it is in the type that I have just described that it does so well, and in which I would recommend its culture on a large scale. It will stand a fair amount of frost as well as great heat, and I have never seen the trees injured by either on our Downs country. I have also seen trees doing well right on the coast, where they have been subject to heavy rainfalls, so that it appears to adapt itself to the conditions prevailing in many parts of our State.

“The olive possesses one great qualification over almost every other known tree—that is, its permanency; once planted under suitable circumstances, and it is planted *practically for ever*. It attains an almost incredible age, and has been extensively cultivated for an unknown length of time.

“The popular belief that the olive is a slow-growing tree, and that it takes many years to come into bearing, must be considerably modified by facts deducible from the experience of modern growers. By careful selection of variety to suit climatic and other considerations, and with intelligent cultivation, the olive has proved itself to be productive as early as the orange.”

Rr. A. Skinner, in “Timely Hints to Farmers” (University of Arizona) says:—

“The two varieties which yield the best products are the Mission and the Mazanillo. Both bear very large fruit. The Mission holds its colour well while being pickled. The Mazanillo is superior to the Mission in flavour, but the fruit is of a finer texture, and is prone to soften during treatment, nor is the colour of the finished product so good as that of the Mission.

“The fruit of the olive, either green or ripe, has a disagreeable, bitter taste, which is due to the presence of a vegetable principle known as ‘*olivil*,’ and before the fruit can become an acceptable article of food, the bitter principle must be removed. The old method practised prior to the past century, and which is still used to some extent in Southern Italy, is to place the fruit in bags in a stream of running water. By a process of leaching, the bitter substance is thus removed, and the fruit is ready for the brine. This method, in addition to requiring from three to six weeks for the leaching, requires exceedingly pure water for the process, and even then the olives are very liable to be ruined by mould and bacteria. It is, therefore, quite impracticable in this country. The method now generally used is to neutralise the *olivil* with weak soda or potash solution, afterwards removing the excess of alkali with pure water. This is the treatment now generally used on a large scale for processing olives. The soda and potash alkalies which are used are obtainable as commercial articles under the name of soda lye and potash lye. Of the several

methods tried, using different amounts of both potash and soda lye, the one which gave uniformly the best results was a combination of soda lye, lime, and salt. The object of the soda, as before stated, is to neutralise the bitter principle; the lime fixes the colour, as the use of soda alone causes the fruit to turn yellow, while the salt hardens the fruit, which has a tendency to soften when treated with lye, especially if the treatment is carried too far.

"The method of procedure is as follows:—The fruit, either green or ripe, is carefully picked into pails about one-third full of water, in order to prevent bruising. This is essential, as bruised fruit will swell during the lye process, and will spoil. The fruit should also be sorted, as it is desirable to have each lot of fruit of nearly uniform size and condition of ripeness, for the lye attacks the ripe fruit more rapidly than the green, consequently the ripe and small fruit would be finished, while the larger or green fruit would still be bitter. The fruit is then placed in stone jars, observing the same precautions in regard to bruising. Wooden kegs and pails may be used, but they are much more difficult to keep clean, and, when once impregnated with the mould which causes so much trouble, are very difficult to sterilise. The water should be drained off, and a solution prepared as follows poured over the fruit: To each gallon of water add 2 oz. of soda lye, 1 oz. of lime, and 1 oz. of common salt. Stir thoroughly and let stand for one hour, when it is ready for use. The water for making this solution should be boiled and cooled, thus retarding the growth of the mould which is likely to give trouble. The solution should cover the fruit about 2 inches, and should any of the fruit float, it is necessary to cover with a board and weight. The time of the lye treatment varies from three to seven days, according to the variety, size, and ripeness of the fruit. The solution should be examined daily, and should the slick, soapy feeling peculiar to lye disappear, it indicates that the solution is exhausted. The old solution should, therefore, be poured off and new solution added. It should also be changed at once should any scum or mould appear. The fruit should be frequently examined, always sampling the largest olives by cutting away a portion with a sharp knife. The progress of the lye towards the interior of the fruit is plainly marked by a distinct dark ring. When the ring has reached almost, but not quite, to the pit, it is time to remove the lye and commence the washing. The lye should be poured off and water added. Fresh water should be added morning and night. The wash water should also, if possible, be boiled, for at this stage the olives are an excellent host for the development of mould. The same precautions as above should be observed to keep the olives under water, and the vessels during extraction, washing, and salting should be kept closely covered. Depending upon the condition of the fruit, the washing requires from four to seven days to remove all traces of the alkali. This can be determined largely by the taste, for as long as any lye remains in the fruit it has a peculiar hot taste. After most of the lye has been removed, should the olives still be bitter, they may again be treated with lye solution. If the lye is allowed to act too long, however, the flavour is injured, and the fruit quickly softens and spoils. The treatment should be carried just far enough to neutralise all of the bitter principle, and no further. Experience and frequent testing are the only methods of determining this. To be absolutely sure that all lye is removed, which is necessary, the fruit should be tested with small bits of red litmus paper. To make the test, a half dozen of the largest olives are broken open and the paper pressed against the pits. The paper will turn blue if only a trace of the lye remains, and should such be the case, the washing should be continued until the paper gives no reaction.

"When free from lye the olives are then ready for salting. A brine should be made containing 2 oz. of common salt to the gallon of water. The solution should be thoroughly boiled and cooled and poured over the olives. The next day the 2 oz. solution should be removed, and a solution containing 4 oz. of salt should be used. If the stronger solution is used to begin with, the olives will shrivel. The fruit should next be treated with an 8 oz. brine, and if

intended to keep for some time, finally with a brine containing 14 oz. of salt to the gallon. A 14-oz. brine, however, makes the olives too salty to be used without a slight soaking.

"A better method of keeping the finished products is to process the olives after adding the 8-oz. brine. For this purpose I used Mason fruit jars and a large tin wash boiler, thoroughly cleaned. The jars were filled with olives and brine, rubbers and covers lightly screwed on, and the jars placed in water heated to 175 degrees Fahr. for thirty minutes. Jars were then removed and covers quickly tightened. By this process the flavour of the olive is not injured, and if properly done the fruit will keep at least several months without deteriorating."

THE FRUIT CASES ACT OF VICTORIA.

The following is a synopsis of the chief features of the Act:—

"Fruit" means apples, apricots, bananas, cherries, currants, figs, gooseberries, grapes, loquats, lemons, nectarines, oranges, passion fruit, peaches, pears, persimmons, pineapples, plums, quinces, or tomatoes, or any fruit which may hereafter be declared by notice in the "Government Gazette."

Baskets, trays, casks, buckets, or crates containing trays, and also patent cases which may have been patented before the commencement of the Act, may be of any size or shape, but must have the net weight or number of contents legibly marked on them.

Fruit may be sold, for two years after the passing of this Act, in any package whatsoever, provided the net weight of contents be truly and legibly marked thereon in letters of not less than 1 inch in length. The date of passing of this Act was 28th December, 1906.

Standard cases need not be so marked. This will allow time for the cases now in use to be displaced by the standard cases.

Second-hand cases will be allowed for local trade, but only new cases will be allowed for the export of fruit from Victoria.

A shrinkage of 5 per cent. on the cubical contents of case will be allowed in second-hand cases. No shrinkage will be allowed in new cases or in cases used for export.

The maker's name and address and the words "Guaranteed by the maker to contain two imperial bushels" (or bushel or half-bushel, as the size of the case may warrant) must be legibly and durably marked on each end of the outside of the case within a space measuring not more than 3 inches in length by $1\frac{1}{2}$ inches in width.

Penalties are provided for the infringement of any of the provisions of this Act.

STANDARD CASES.

For Local Trade.

1. Double or two-bushel cases: 26 by 12 by $14\frac{1}{4}$ inches (4,446 cubic), inside measurement and clear of divisions.

2. (a) Single or one-bushel cases: 26 by 6 by $14\frac{1}{4}$ inches (2,223 cubic), inside measurement and clear of divisions; or

(b) 18 by $8\frac{7}{8}$ by 14 inches (2,237 cubic), inside measurement, and no divisions allowed.

3. (a) Half or half-bushel cases: 26 by 6 by $7\frac{1}{8}$ inches (1,112 cubic), inside measurement and clear of all divisions; or

(b) 18 by 7 by $8\frac{7}{8}$ inches (1,119 cubic), inside measurements, no divisions allowed.

For Export Trade.

See 2 (b) and 3 (b) above.

Copies of this Act may be obtained in Victoria, from the Government Printer or any reputable stationer.

Horticulture

FLOWER GARDENING.—No. 5.

By THE EDITOR.

PLANTS SUITABLE FOR OUTDOOR CULTURE.

CHRYSANTHEMUMS.

There are few plants that respond so readily to liberal treatment as does the chrysanthemum. Of late years the rage has been to produce blooms of great size at the expense of number. These monster show blooms are right enough on the show table, but most people will agree with me that, for decorative purposes, the small and medium blooms commend themselves to the decoration of the dining-table or of the drawing-room. The varieties of the chrysanthemum are legion, and all can be grown in almost any part of Queensland. All it asks is a liberal supply of water during its growing period. Now, there are two ways of growing chrysanthemums. The first is generally adopted by the careless amateur. He gets a plant, sticks it in one corner of his garden, and trusts to Nature for the rest. He leaves it there, year after year, until it covers a square yard of ground. It produces a number of small flowers, and he is quite satisfied.

But the professional or enthusiastic amateur gardener goes about it in a very different way. He gets a plant, and takes every care to hasten and develop its growth; he feeds, waters, prunes, disbuds, and keeps it tied to stakes, and when the blooms appear he shades them from the hot rays of the sun. Now, I will tell you how to be successful with chrysanthemums: First of all, dig the land deeply, manure it heavily, drain it well, and thoroughly pulverise it. If the soil be clayey, add a few barrow-loads of sand or coal ashes, pounded oyster-shells, or broken coral. Having thus prepared the land, plant your suckers, and, as soon as growth commences, water well, and twice a week apply liquid manure. When the shoots are 6 inches high, pinch the top off; this will make them branch out. Allow three or four of the lateral branches so produced to grow to the height of 8 inches, and then pinch the tops off them to encourage lateral growth. On these laterals the flowers will be formed, and, if exhibition blooms are wanted, the flower buds must be thinned out to one or at most two of the terminal buds. If you want only medium blooms, nip off the terminal buds and leave the secondary, removing only those buds which are too close together. Now, keep a careful eye on the general growth of the plant to prevent the growth of too much wood. Remove all the young shoots which may appear anywhere below the flower shoots, being careful to leave sufficient foliage to keep the plant in health, always remembering that the leaves of all plants play an important part in their breathing and evaporating functions. Never allow the chrysanthemum to suffer for want of water. The wood of the plant being very brittle, a stake should be furnished to tie the stems to. Tie with some soft material to avoid injuring the bark.

When the flowering season is over and the plants begin to look shabby, cut them down level with the ground. Fork round the roots, add a good mulch, and let the plants remain until next spring planting season, which extends from October to January.

Chrysanthemums are divided into four groups, according to their general characteristics, as—

Incurved—the petals turn inwards;

Reflexed—the petals turn outwards;

Interlaced—the petals turn inwards; and

Anemone-flowered—the petals are quilled like the aster.

Japanese—the petals are large and irregular in shape, often parti-coloured.

Pompom—the petals are nearly always erect, and many-flowered.

To fertilise chrysanthemums, a French grower adopts a novel method. He collects all the remains of his old plants, dries them, and makes an extract by boiling them in water. This he uses as a liquid fertiliser, and he finds it very satisfactory.

GLADIOLUS.

The gladiolus belongs to the Iris family. The ixias, watsonias, crocus, &c., are its near relations. The genus contains a large number of species and varieties, most of which are exceedingly beautiful. In Queensland they thrive uncommonly well, although the blooms are not so lasting as they are in cool climates. To remedy this disability, a good plan is to keep the corms out of the ground as long as possible without causing them injury, so that they may flower when the great heat of summer is past. In order to have tall strong flower spikes, the corms should be planted in deeply trenched and highly enriched soil. The trenching should be from 2 to 3 feet deep, and 6 inches or more in depth of rotten stable manure should be mixed with the lower strata. In this the roots will luxuriate, and produce flower stems of immense size. In order to prolong the duration of the flowers, they may be planted under a framework that can be covered with a canvas shade. There are two sections commonly grown—the early and the late flowering. The former may be planted in autumn, the late-flowering as above directed.

The plant thrives best in a somewhat heavy yellow loam of an adhesive nature, without any admixture of sand. On such a soil a vigorous and healthy stock of gladioli may be kept up year after year, no matter whether the season be hot or cold, dry or wet. Attempts have been made by clever horticulturists to grow these flowers in light sandy soil, but the cultivation had to be abandoned. If you have a fair average soil, however, well worked and drained, you may be sure you will be successful in raising the gladiolus. They must not be planted in badly-drained, sour soil, or in manure (particularly fresh manure), in immediate contact with the bulbs.

Generally, in this State, the best time to commence planting is July or early in August. Plant singly, in clumps or in rows from 12 to 18 inches apart, and let the crown of the bulb be 4 inches below the surface; indeed, it may be planted 10 inches deep and left in the bed for years, until it gets too close to the surface. Every year the new bulb forms on top of the old one, so it rises about an inch annually. If a late frost cuts the young sprouts to the ground it continues to grow just the same, and is not discouraged by being cut back repeatedly. If the bulb is placed wrong side up it grows about as well; and if it has to stand in water for days, or endure drought for months, it will make the best of its opportunities, giving an abundance of bloom. When the first few flowers open, the spike may be cut and kept in the house as well as on the plant, giving constant bloom for one or two weeks, according as the weather is warm or cool.

In ten weeks some varieties will produce flowers, and others two or three weeks later. While growing, the gladiolus needs the same care that other crops do. Keep the ground clear of weeds, and hoe it occasionally, and stake the plant as soon as the flower buds appear. As soon as the leaves are yellow, lift the bulbs and store them in a cool place until the planting season comes round again. If you have a particularly choice variety, remember to preserve the small bulbils to be found more or less around the base of the mature plant. Plant these in a seed bed in drills. Most of these will grow and flower in the following season. If you grow year by year from the original bulb, the plants deteriorate, and the original at last runs out.

Gladioli are readily raised from seed, and will flower in the second season, sometimes before. Save from the best varieties, and sow in drills in the seed bed about 1 inch deep, and from 8 to 10 inches apart.

HOLLYHOCKS.

These old favourites of the English cottage garden certainly deserve a place in all Queensland flower gardens. The splendid double sorts, which have practically usurped the place of the single varieties, produce flower spikes 6 feet high, studded with splendid camelia-like blooms for some feet of their length. Hollyhocks are not difficult to grow from seed, if sown in autumn and liberally treated with rich soil and moisture. They are tender perennials. There are few plants more effective than well-grown specimens of the best double varieties.

The hollyhock thrives best in a deep, dry loam, trenched, with a liberal supply of well-rotted stable manure. It will not thrive in a wet, ill-drained soil. It is propagated by seed, cuttings, and division of roots. Whichever of these methods is adopted, the utmost care must be taken to avoid excess of moisture until the plants are strong enough to resist "damping off," which is usually the result of too copious watering.

Plant out during autumn or very early in the spring, when the soil is damp, but not sticky. During the hottest part of the day the plants require shade, and to afford this, tall shady shrubs may be planted at some distance from them, in such a way that the requisite shade is given without overcrowding them by strong plants growing close to them. The ground should be mulched with long stable litter, which will protect the roots and also stimulate growth. In dry weather give a reasonable amount of water occasionally, but avoid drenching the soil. When the buds are formed upon the spikes the plants should be watered every other day with liquid manure. The spikes should be tied to stakes to protect them from injury from high winds.

When the plants have done flowering, gather the seeds early, so that the old flowering spike may be cut off to encourage the root to throw up shoots for cuttings. Sow the seed as soon as it is ripe, and, by transplanting the young plants, when large enough, into separate pots, they will be strong for blooming during the next spring and summer.

Although hollyhocks generally come true to seed, yet, when it is desired to increase approved sorts, it is well to resort to cuttings, as they strike very readily.

PETUNIAS.

The petunia as a summer flower is much neglected. It is essentially a lover of hot weather, and, given even a moderate supply of water, will make a grand show in the garden. Next to their beauty, variety, and fragrance is the fact that they are most constant bloomers, remaining in flower from early summer until cut by the frost. To keep up a constant supply of bloom the plants should be repeatedly cut back. Any ordinary garden soil suits them, and the young plants should be placed 12 inches apart. Plants from seed sown in March will flower before they are checked by the cold weather, and a light covering of bushes over the plants will be sufficient protection for an ordinary winter in this climate. The plants grow so easily from seed that it is only necessary to protect a few really good varieties for growing the following year. The double-fringed variety is most handsome, and, as it is a greedy feeder, should be given plenty of stable manure while the plants are growing strongly. Old plants may be cut close down in spring and started in heat, or cuttings may be struck in spring to flower the same season. They require rich soil, and, if grown in pots, plenty of pot-room.

Petunias, in their many beautiful varieties, form a highly interesting and desirable class of free-flowering plants for garden culture, those of the grandiflora section, both single and double flowered, being specially valuable. The

blooms of these are of immense size, beautifully formed, and of the most charming and delicate colours; some of the flowers are exquisitely veined or pencilled, others blotched or striped. The "fringed" varieties (both double and single, produce some charming flowers, the edges of the petals being elegantly cut or fringed, whilst the colours are most varied and beautiful. The petunia is well adapted for pot cultivation, and on account of its hardiness and free-blooming qualities, makes an excellent window or veranda plant. A soil composed of equal parts of loam and thoroughly decayed cow dung, with plenty of sharp sand added, forms an excellent compost for these; but the seeds, being very small, require special care in sowing. Fill your pots or seed pans to near the rim, and press the soil down firmly and evenly; sow thinly, and cover the seeds very lightly with fine soil, and keep it moist. As soon as the young plants are fit to handle they may be planted into the places where they are to remain, taking care to shade and water them till they are thoroughly established, or they may be put into small plots and planted out when larger. Petunias may be sown in autumn and spring.

SOME GOOD VARIETIES.

Belle Etoile.—A beautiful, large-flowered strain, striped and blotched.

Grandiflora superbissima.—A magnificent variety, produces enormous flowers with handsome tigred throat.

Giant of California.—Exquisitely fringed and of enormous dimensions, often measuring 5 inches across. Their great merit, however, lies in the marvellous variations in colour, some of the flowers having deep throats of yellow, white, black-green, and maroon, running off into intricate veins of exquisitely-pencilled combinations quite new in petunias. The flowers are of great substance.

Baby Blue.—It begins to bloom when only a few inches in height, and flowers profusely until killed by frost. The flowers measure only $1\frac{1}{2}$ inch across, and are a soft reddish purple, but when seen *en masse* in strong sunlight appear a lovely blue; small, very dark-green leaves.

Large-flowered Single, and Double-fringed.

HYDRANGEA.

Hydrangeas are of easy culture, and are exceedingly ornamental, whether grown in the bush-house or in the open. The sorts having abortive or sterile flowers, with an enlarged calyx, are the most ornamental.

Propagation is readily effected from cuttings of young or partially ripened shoots, which may be inserted at almost any time when they are procurable. Old plants may be divided for propagation. For culture outside, a somewhat sheltered situation should be selected, except in favourable localities.

Cultivation.—No special directions are needed for the cultivation of hydrangeas in the open garden. They may be propagated annually to produce one head of flowers each—a method largely practised—or they may be grown as shrubby plants for several years in succession. Cuttings should be inserted in small single pots and plunged in a close warm frame. Take the cuttings in spring from young growths which are not bearing flowers. Another plan is to let the old plants grow all the season, and put in strong points as cuttings when partially ripened. Select the tops of the strongest and most prominent shoots for cuttings, and insert them in March. When they are rooted, gradually harden off, and expose them to full sunshine and air in autumn. The embryo buds formed at this period will expand in the spring, but it is not usual for all to flower. As a rule, the flower appears with the fourth pair of leaves, and should the plant develop so far without the embryo being seen, throw it away unless it is required for another year. A new stock of these dwarf pot plants should be propagated annually, and the old ones be used for planting out in the open.

Hydrangeas like a rich soil, such as loam and decayed cow manure in equal parts. Any quantity of water may be applied in the growing season, and artificial manure, given just as the flowers are developing, invariably proves beneficial. The flowers sometimes turn blue, certain soils having the property of changing the normal colour in consequence of the presence of some chemical constituent. Water in which alum has been dissolved is used to artificially produce the same effect. In some gardens plants which produce red flowers one year may develop blue ones the next, and this without any influence or skill on the part of the cultivator.

A large bush will often, it is said, absorb as much as 12 gallons of water in a single day.

Two Good VARIETIES.

Hydrangea hortensis, and some of its varieties, have nearly all sterile flowers, and are consequently most popular. *H. paniculata grandiflora* is very handsome, and amongst the best, either for pot culture or for outside treatment. The American species are hardier, but not so ornamental as those from China and Japan.

Times of Sunrise and Sunset at Brisbane, 1908.

DATE.	MAY.		JUNE.		JULY.		AUGUST.		PHASES OF THE MOON.
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	
1	6.14	5.16	6.30	5.0	6.39	5.4	6.30	5.18	1 May ☉ New Moon 1 33 a.m. 8 " ☾ First Quarter 9 23 p.m. 16 " ○ Full Moon 2 32 " 23 " ☽ Last Quarter 10 17 a.m. 30 " ☉ New Moon 1 14 p.m.
2	6.14	5.15	6.31	5.0	6.39	5.4	6.29	5.19	
3	6.15	5.15	6.31	5.0	6.39	5.4	6.29	5.19	
4	6.15	5.14	6.32	5.0	6.39	5.5	6.28	5.20	
5	6.16	5.13	6.32	5.0	6.39	5.5	6.28	5.20	
6	6.16	5.12	6.33	5.0	6.39	5.5	6.27	5.21	
7	6.17	5.12	6.33	4.59	6.39	5.6	6.26	5.21	
8	6.17	5.11	6.33	4.59	6.39	5.6	6.25	5.22	7 June ☾ First Quarter 2 56 p.m. 14 " ○ Full Moon 11 55 " 21 " ☽ Last Quarter 3 26 " 29 " ☉ New Moon 2 31 a.m.
9	6.18	5.10	6.34	4.59	6.39	5.7	6.24	5.22	
10	6.18	5.10	6.34	4.59	6.39	5.7	6.24	5.23	
11	6.19	5.9	6.35	4.59	6.39	5.7	6.23	5.23	
12	6.19	5.8	6.35	4.59	6.38	5.8	6.22	5.24	
13	6.20	5.8	6.36	4.59	6.38	5.8	6.21	5.24	
14	6.21	5.7	6.36	4.59	6.38	5.9	6.21	5.25	
15	6.21	5.7	6.36	4.59	6.38	5.9	6.20	5.25	7 July ☾ First Quarter 6 25 a.m. 14 " ○ Full Moon 7 48 " 21 " ☽ Last Quarter 10 2 p.m. 28 " ☉ New Moon 5 17 "
16	6.22	5.6	6.37	5.0	6.37	5.10	6.19	5.26	
17	6.22	5.6	6.37	5.0	6.37	5.10	6.18	5.26	
18	6.23	5.5	6.37	5.0	6.37	5.11	6.17	5.27	
19	6.23	5.5	6.37	5.0	6.37	5.11	6.16	5.27	
20	6.24	5.4	6.38	5.0	6.36	5.12	6.15	5.28	
21	6.25	5.4	6.38	5.1	6.36	5.12	6.14	5.28	
22	6.25	5.3	6.38	5.1	6.35	5.13	6.13	5.29	5 Aug. ☾ First Quarter 7 40 p.m. 12 " ○ Full Moon 2 59 " 19 " ☽ Last Quarter 7 25 a.m. 27 " ☉ New Moon 8 59 "
23	6.26	5.3	6.38	5.1	6.35	5.13	6.12	5.29	
24	6.26	5.2	6.39	5.1	6.34	5.14	6.11	5.30	
25	6.27	5.2	6.39	5.1	6.34	5.14	6.10	5.30	
26	6.28	5.1	6.39	5.2	6.34	5.15	6.9	5.31	
27	6.28	5.1	6.39	5.2	6.33	5.15	6.8	5.31	
28	6.29	5.1	6.39	5.3	6.32	5.16	6.7	5.31	
29	6.29	5.1	6.39	5.3	6.32	5.17	6.6	5.32	
30	6.30	5.0	6.40	5.3	6.31	5.17	6.5	5.32	
31	6.30	5.0	...	...	6.31	5.18	6.4	5.33	

Tropical Industries.

COCOANUT-PLANTING, TERRITORY OF PAPUA.

(From particulars supplied by Mr. N. R. Schroder to "Dalgety's Review.")

The interest which is being aroused in the Commonwealth at the present time by the possibilities of the territory of Papua for cocoanut and rubber cultivation has induced Mr. N. R. Schroder, of Milne Bay, Papua, to send us some particulars of the former industry, which we have pleasure in publishing for the information of any intending planters.

The territory is situated outside the hurricane zone, has an agreeable climate, and a plentiful rainfall (except in the dry belt of the Central Division). Thus, the planter has every advantage which Nature can bestow to render his enterprise successful.

The soil is considered equal in richness to any in the world, and our correspondent's experience leads him to express it as his opinion that, in the course of a few years, when Australia has realised what a valuable asset she possesses right at her very doors, Papua will have become the most prolific and richest exporter of tropical products outside of Ceylon. Labour is plentiful and cheap, and land easily obtainable on the most liberal terms.

A good deal has been written on the subject of cocoanut-planting during the last few years, mostly by people in India, but comparatively little has been said by those conversant with the conditions obtaining in the South Sea Islands and British New Guinea to help intending planters who may be thinking of taking up land in Papua.

With regard to choice of land for cultivation, if no island is available, and land is taken up on the mainland, it should be as flat as possible. If a river or two run through the property, so much the better. They will help to irrigate the land, and cocoanuts require a great deal of water (running, not stagnant); if there are any swamps they must be thoroughly drained before any planting is attempted.

After land has been taken up, the next step is to obtain labour to cultivate it. "Boys" may be had from the local recruiting vessels at from £1 15s. to £2 per head (for one-year boys). These figures refer to New Guinea. In the Solomon Islands the rate is from £4 to £6 per head for three-year boys. The food of these labourers consists of rice, sweet potatoes, with meat twice a week. They also get a tobacco allowance of, say, two sticks per week. Their only requirement in the matter of clothing is one Lava-lava every three months, and one blanket per boy per annum.

There are many ways of clearing land, but the following method has been found the best. After the forest has been cut down, lop off all the branches of trees and then run a fire through. After this, stack all unburnt timber around stumps and big logs, and fire once again. Do this twice so as to leave as little dead timber as possible on the plantation. The timber, if left to rot, will in time manure the ground, but this method entails the harbourage of an immense number of grubs and beetles, and these insects, breeding rapidly, leave the old logs and take up their residence in the young sweet cocoanuts, causing untold damage. By firing the ground thoroughly, these insect pests are kept within bounds.

NURSERIES.

If there are no plantation near where seed nuts may be obtained, great care must be taken in the selection of nuts for planting. It is better to depend on the natives for them, and to go personally and buy them, inspecting the cocoanut-trees, and picking the nuts therefrom, taking particular care that the tree is not too old or too thin or too tall, but a young, vigorous, solid, and stout tree; also seeing that the nuts it bears are plentiful in number, and of a good shape. They should not be long and narrow, but round, with little

husk and plenty of milk. Open them and note how thick the flesh is. Do not always choose the big-looking nuts, as they may have a very large husk and yet be small in the nut proper. Take no nuts from yellow-looking trees. The dark-green trees are the best.

Having gathered all the seed nuts required, make a nursery, hoeing up the ground to a depth of about 1 foot, and removing all weeds. In setting the seed cocoanut cover about two-thirds of it, laying it at an angle of about 45 degrees in the earth, covering lightly with leaves. When the young trees have reached a height of 12 or 18 inches transplant to the plantation, being careful to pick out all the healthiest and to condemn the weak ones. This will be in about three months after the setting in the nursery.

From the foregoing it will be seen that it is advisable to get the nursery going early, so as to be ready to plant out when land has been cleared and got ready to receive the young plants. No time is, therefore, lost by this arrangement. Advantage should always be taken of a downpour of rain, and planting out should be undertaken immediately the ground is sufficiently moistened.

In transplanting, a sharp knife should be used in order to slice the roots off close to the husk. Holes should be dug about 2 feet in depth and 2 feet in diameter, and the nut planted therein about 9 inches below the surface, a filling of 9 inches of surface mould being placed at the bottom of the hole. The nut should then be completely covered. Keep a ring of about 12 feet in diameter around each plant, and the intervening ground well hoed and free from weeds, because the roots require a great deal of air and light during the first three years of the plant's existence.

The lining out of nuts should be done very carefully, so that the trees are in line both horizontally and transversely, and so that they are not more than 30 feet apart. No other trees should be planted in between. Some planters have planted 33 feet apart, and are now putting rubber between the rows. This is considered a mistake, as both classes take a great deal out of the ground, and as they attain to maturity their roots will become interlocked. Thus they will be fighting for supremacy beneath the surface, and are bound to cripple each other in the long run. If it is desired to cultivate both classes of trees, Mr. Schroder's advice is to strictly plant them apart.

INSECT PESTS.

Beetles will, of course, be found on every plantation, however well kept it may be; but the clearing of the land of all dead timber will make the number very much less than if the logs were left to rot away on the ground. More beetles have been found in the cocoanut-trees planted on the outskirts of a plantation where the bush is rubbing shoulders, so to speak, than in the plantation itself, whence all dead timber has been removed.

There are several kinds of beetles inimical to cocoanuts. The big "Rhinceros" species seems to do most damage. This beetle grows to a length of 2 inches and a girth of 1 inch. It burrows a way through the young trees right into the soft heart. It does not require much imagination to estimate the damage this pest can cause. The tree will look quite healthy, new shoots will spring out, and cocoanuts appear as on any other tree, but the nuts will never ripen—as soon as the flesh begins to form in it the nut will drop off.

Until the beetle has been got out of the tree, the planter need not look for any return for all his work and outlay of money; for the creature will continue to eat its way upwards towards the new shoots, and all the nuts will be affected the same as the first. This beetle, however, can be extracted by an easy process.

Procure a wire about 3 feet in length, with a handle at one end and the other end twisted corkscrew fashion. Now, look under the leaves and you will notice that the cloth around the tree appears as if it had been chewed by a rat; pull it away and the beetle's hole will be visible; then push the wire up as far as it will go, twist it round, and in nine instances out of ten you will succeed in extracting the beetle. Dust the leaves near the trunk with Paris

green, also putting Paris green in the hole. This will destroy any eggs the beetle may have left behind. A boy can be taught this method, and in a very little time he will become quite an expert. It is well, however, to give him a tin and to make him bring the captured beetles to you. It will be a matter of surprise what a large number he will find on a plantation where the logs have been left to rot on the ground between the trees.

Another small beetle which is very plentiful attains a length of $\frac{1}{2}$ -inch, but is very thin. It has a light-brown head and a dark body. This insect enters very young trees and feeds on the leaf that is just forming. Trees that are infested with this pest are easily distinguishable, for dry spots appear on the leaves. The presence of the beetle does not kill the tree, but retards its growth considerably. Wood ashes or Paris green is an effective remedy; open out the new leaf very carefully and dust in the same manner as for the "Rhino-ceros" beetle.

The grub is another source of annoyance to the cocoanut-planter. He enters the tree from the roots and works his way upwards. His presence can be detected by the grating sound which he makes. When the sound has been located a hole should be cut in the tree and the grub extracted. Fortunately, this pest is seldom met with, and visitations are rare from it in Papua.

If the plantation be near the sea-front, all intervening timber should be cut away right down to the water's edge, as the cocoanuts require plenty of air, and the salt sea breeze is very beneficial to them. Seaweed, too, makes an excellent manure, and helps the young nut considerably. It may be remarked here that the first two flowers should be cut off, as this strengthens the young tree.

ESTIMATE OF EXPENSES AND RETURNS.

For the further guidance of intending investors, a table is appended which gives approximately Mr. Schroder's idea of the expenses incurred in running two plantations of 1,000 acres, and of the profits to be derived therefrom.

This estimate, our correspondent mentions, is based upon a very low price for the product—viz., £10 per ton. Copra he puts down at £16 per ton in Sydney; but £10 he considers a bed-rock figure, below which the market is very unlikely to go for many years.

Expenses for First Year.—Area Planted, 500 Acres.

	£
Manager	300
Assistant manager	200
200 boys	900
Tools	125
33,000 seed nuts (imported)	231
Food for boys	150
Incidentals	100
Recruiting, tobacco, medicine, blankets	500
Returning boys	100
Manager's and assistant's house	250

£2,856

Second Year.—Area Planted, 300 Acres.

	£
Manager	300
Assistant manager	200
150 boys	597
20,000 seed nuts	140
Food for boys	125
Recruiting, tobacco, medicine, blankets	400
Returning boys	75
Incidentals	100

£1,937

Third Year.—Area Planted, 180 Acres.

	£
Manager	300
Assistant manager	200
100 boys	450
11,000 seed nuts	77
Recruiting, &c.	350
Incidentals	100
Food for boys	75
Returning boys	50
	£1,602

Fourth, Fifth, Sixth, Seventh, and Eighth Years.

	£
Manager	300
Boys	450
Tools	50
Recruiting, &c.	350
Food	75
Returning boys	50
Incidentals	100
Two native overseers	48
	£1,423

Summary.

	£
First year	2,856
Second year	1,937
Third year	1,602
Fourth, fifth, sixth, seventh, and eighth years	7,115
	£12,510

Expenses per Year 1,000 Acres Fully Planted and Bearing.

	£
Manager	300
Two native overseers	48
Boys' wages	450
Freight to Sydney, £1 10s. per ton	984
Insurance, commission, 5s. per ton	164
Incidentals	100
Imports	100
Recruiting and returning boys, &c.	300
	£2,446

1,000 Acres, Bearing 53 Trees to 1 Acre.

1,000 acres
53 trees to 1 acre

53,000 trees in all

60 nuts on each tree (low estimate)

3,280,000 nuts in all

5,000 nuts to 1 ton copra
656 tons copra per year
£10 per ton Sydney price
£6,560 income per annum

Total Income, Expenses, and Net Income 1,000 Acres, Fully Bearing.

	£
Income	6,560
Expenses	2,446
Net income	£4,114

During the first six years there is no income to speak of, with only a little during the seventh and eighth years. It is in the early stages, says Mr. Schroder, all expenses and hard work, but, with the exercise of economy, a 1,000-acre plantation ought to be brought to maturity for £13,500.

NOTES ON RUBBER IN TROPICAL AUSTRALIA.

By HOWARD NEWPORT, F.R.H.S., Instructor in Tropical Agriculture and
Director of the Kamerunga State Nursery.

To those concerned in the extension of rubber cultivation in Queensland recently, the following figures may be of interest. Of the plants imported by Mr. F. P. Logan, in January, 1907, 4,040 were finally distributed; of the Department's special importation in January, 1908, including plants raised from seed obtained at the same time, 7,434 plants resulted; plants raised from seed at the Kamerunga State Nursery, including seed distributed (allowing for a 52 per cent. germination only), 4,726 plants. This gives a total of 16,200 plants distributed up to the end of April, 1907, equal to an area of 81 acres if planted 14 by 14 feet (or 200 to the acre), and if all were planted in definite areas, which, of course, they are not, many having planted but a few trees in their gardens and along roadsides, &c., in their farms.

The foregoing figures refer only to Pará Rubber (*Hevea Braziliensis*). Of other rubbers, mostly Assam or Rambong (*Ficus elastica*); Central American (*Castilloa elastica*); Ceara (*Manihot glaziovii*); and African (*Funtumia elastica*), enough plants have been distributed to plant about 7 acres, as well as some 11,000 seed.

Of the Department's first importation in January of this year, the seed imported resulted in a germination of about 37 per cent., and the plants suffered a mortality *en route* of about 20 per cent. This was, however, mainly due to the consignment having been unfortunately carried on to Brisbane and returned to Cairns, involving an extra fortnight at sea, instead of having been landed in the North. Of the plants thus imported, some 2,500 are still in hand, but have all (and more) been bespoken, and are awaiting despatch.

The Department is making another importation of some 10,000 seed or plants, and it would be as well for intending growers to bespeak these as soon as possible to ensure getting the number they want.

The Pará rubber plants put out in banana plantations that are still being worked, and in which the rubber can benefit by the clean weeding and partial shade, are doing remarkably well in the vicinity of the Tully River, near Cardwell, and Johnstone River, at Geraldton. Many of these plants, barely 18 inches high, and as thick as fencing wire when planted, now show 7 feet in height and a circumference of 3 inches at the ground for the year's growth.

Having been planted among the bananas, they participated in the cultivation, and thus the cost of upkeep has been practically nil. By the time the

bananas are, according to the Chinese ideas, worked out, the rubber should be big enough to tap.

Regarding the value of land so planted, it will be interesting to note that the "Times of Ceylon" suggests that £100 per acre would be a moderate price for six-year-old rubber.

If only all the land that has been under bananas and subsequently abandoned, or even the land now being cultivated with bananas, were so planted, and became, with little or no cost, five or six year old rubber plantations when no longer required for bananas, what an asset to the State, not to mention the landowner, and what a contrast to the present methods whereby such abandoned areas grow only noxious weed!

The price of rubber has dropped considerably since this time last year, and good plantation Pará now fetches between 3s. and 4s. per lb. It is, however, expected to rise somewhat, though not to the figures of last year. Despite this, however, the opinion of those most interested, as shown in the following extracts from the "India Rubber World" for March, will be of interest:—

"Mr. James Wilson, of England, chairman of the Ceylon Land and Produce Company, on seven of whose plantation 5,695 acres have been planted to rubber, after a recent visit to Ceylon, expressed the opinion that rubber planting will pay for many years to come. He thinks that the price ought to rise a bit when the money market resumes its normal condition, but not to the high prices of a year ago.

"A planter from Ceylon, who visited England lately, reports an interview he had with one of the directors of the India Rubber, Gutta Percha, and Telegraph Works Company, at Silvertown, who expressed the opinion that rubber planting would be a good investment for the next twenty years at least. The rubber manufacturer felt that if rubber remains as cheap as now, a marked increase in its use would result."

Rubber is being extensively planted in the tropical countries all round us. In Sumatra alone, a correspondent of the "Ceylon Observer" states that 2,000,000 trees, representing 14,000 acres, have been planted. He adds that three rubber trees on an old coffee plantation are reputed to have yielded over 5 kilograms (11 lb.) each in one year.

Even at a profit of 1s. per lb., and a production of 1 lb. per tree, the return per acre of 200 trees is good; at 3 lb. per tree it will compare favourably with any agricultural product whatever in the country; and, with a possibility of such returns as above quoted, or even a portion of it, the returns, to say the least, are attractive enough for the most sanguine.

Rubber companies are quoting 15 to 30 per cent. dividends per annum in Ceylon, the Straits Settlements, Java, Sumatra, &c., and will shortly be doing so in the Solomon Islands and Papua. Why not in North Queensland?

One more quotation, *re* synthetic rubber from the "India Rubber World" is to the point:—

"While a great deal has been printed in England and the British colonies during the past year on the subject of 'artificial' or 'synthetic' rubber, and the possibility of some such material competing with natural rubber, it does not appear that any real progress has been made in the new field. In other words, the rumours referred to have served only to scare some investors in rubber-planting companies. The sentiment of the British crude rubber trade, after a year of such rumour-mongering, is well expressed in this paragraph from the review of the trade for 1907, issued by Lewis and Peat, London rubber brokers:—'During the past year artificial rubber has been talked about a great deal, but, so far, nothing tangible has been forthcoming, and we do not know anyone in the rubber trade of any importance or authority who believes in the likelihood of the production of a substitute for the real article, or has seen a sample of it, and at the lower range of prices for all kinds of rubber and the increasing supplies the danger now from this source is more remote than ever.'"

Chemistry.

ELEMENTARY LESSONS ON THE CHEMISTRY OF THE FARM, DAIRY, AND HOUSEHOLD.

By J. C. BRÜNNICH, Agricultural Chemist.

TWENTY-THIRD LESSON.

INSECTICIDES. FUNGICIDES. DESTRUCTION OF WEEDS.

Chemistry has to come to the aid of the farmer in his continual battle with insect pests, plant diseases, and weeds; and for this reason it will be of some value to devote this, our last lesson, to a short study of the chemicals which are used as preventives and remedies.

Insecticides.—When making choice of a remedy for the destruction of insects, or if they suck the food, like plant lice and true bugs. Gnawing their food; if they chew or bite the food, like most of the beetles and larvæ of insects; or if they suck the food, like plant lice and true bugs. **Gnawing insects** may be destroyed by coating leaves and stems of plants with a poisonous substance which does not injure the plants. **Sucking insects** can only be destroyed by substances externally applied to the insects, which either cause death by a corrosive or irritating action on the skin, or by a mechanical action of closing the breathing pores. Certain other substances are also frequently used, which prevent the attack of insects, either mechanically by acting as a barrier, or, again, by keeping the insects away on account of powerful offensive odours of the substances. All insects which bore into fruit, branches, trunks, and roots of plants will have to be treated in different manners, and a full account of such treatments are given in the pamphlet on "**Citrus Culture**," by A. H. Benson, Instructor in Fruit Culture, published by the Department of Agriculture and Stock, in January, 1908.

The principal **Food Poisons** used against insects devouring their food are **arsenical preparations**, in a more or less soluble form. The more insoluble the preparation the less will be the injury to the plants.

Arsenious acid, or white arsenic, As_2O_3 , is the active ingredient of all the arsenical poisons, but cannot by itself be used as an insecticide on account of the strong corrosive action on the foliage. It is an extremely poisonous substance, as about 2 grains can be fatal to an adult, 10 grains usually kill a cow, 30 grains are fatal to a horse, and 1 grain will kill a cat or dog. The greatest care has, therefore, to be exercised in the use of all insecticides containing arsenic.

The principal arsenic compounds used are: *Lead Arsenate*, *Scheele's Green*, *Paris Green*, and *London Purple*, enumerated in order of their solubility, the first preparation being the most insoluble one. The preparations are generally applied after suspension in water as a spray. All the compounds are very heavy salts, and readily settle down in the spraying liquid, which, therefore, must be kept well stirred during the spraying operation. The operation should not be done during rainy weather, on very hot sunny days, or when strong drying winds are blowing.

Lead Arsenate is obtained as an exceedingly fine white precipitate, when a solution of sodium arsenate is mixed with a solution of lead acetate (sugar of lead). The preparation is used at the rate of 1 to 2 lb. of lead arsenate to 150 gallons of water, but can be applied very much stronger without doing injury to the plants.

Scheele's Green, or Copper Arsenite, CuHAsO_3 , is at present rarely used, being entirely replaced by

Paris Green (Schweinfurt or Emerald Green), a cupric arsenite and acetate $3 (\text{CuAs}_2\text{O}_4)$, $\text{Cu} (\text{C}_2\text{H}_3\text{O}_2)_2$, which should contain not less than 50 per cent. of arsenic, of which only a very small trace should be soluble in water. The soluble arsenic causes injury to the foliage, and this may be avoided by adding to the prepared spray some freshly slaked lime (about twice the bulk of lime as of Paris Green).

London Purple is an arsenite of lime, obtained as a by-product in the manufacture of aniline dyes, which contains about the same amount of arsenic as Paris Green, but in a much finer form, which remains longer in suspension. The preparation, however, is slightly more soluble, and, therefore, more liable to injure the foliage, which may be overcome by using an excess of lime. This compound is the active ingredient of **Kedzie's Mixture**, a preparation often used as a spray.

For the destruction of sucking insects **contact poisons** have to be used, of which the principal ones are: *Soaps and oils* (in form of emulsions), *resin washes*, *sulphur*, and its compounds; and a few finely-powdered vegetable substances, like *pyrethrum*, *hellebore*, and *tobacco dust*. With contact poisons may be included the destruction of insects of all classes by the *fumigation with poisonous gases*.

Pyrethrum, Persian or Dalmatian Insect Powder, Insectibane, &c., consists of the finely-ground flowers of plants of the genus *Pyrethrum*. It may be used as a dry powder, or in the form of a decoction made with water, alcohol, or kerosene, and also by the fumes produced on heating or burning the dry powder.

Hellebore is a fine brownish powder made from the roots of the White Hellebore Plant (*Veratrum album*), containing a vegetable poison, which kills insects both by contact and by being eaten. It is used in the dry state or as a watery decoction.

Tobacco dust owes its value to the vegetable poison nicotine; it is used in a dry state, as a decoction, or, again, in the form of smoke. The refuse of cigar and tobacco factories is largely used for the manufacture of various preparations.

Sulphur in the form of flowers of sulphur is also used as an insecticide, and becomes much more active when boiled with lime or with caustic soda, so as to form calcium sulphide and sodium sulphide.

Kerosene can be used in its crude state as an insecticide, but many plants are injured by its application; and, for this reason, kerosene, crude petroleum, and similar oils are generally used in a diluted form as an **emulsion**, made with soap and water or with sour milk. A good kerosene emulsion is made by dissolving $\frac{1}{2}$ -lb. of soft soap—preferably whale-oil soap—in 1 gallon of boiling water, adding 2 gallons of kerosene, and churning the mixture with the aid of a spray pump, syringe, or an atomiser for at least ten minutes, until the liquid has been changed into a creamy mass. One gallon of this emulsion is diluted with 7 gallons of water, and applied with a spray pump. A very good emulsion is also made by churning 2 gallons of kerosene with 1 gallon of slightly warmed sour milk, and diluting this emulsion 7 to 10 times with water.

Resin washes are largely used for scale insects, and are made by boiling resin, fish oil, caustic soda, and water for several hours. Dissolve in an iron boiler $\frac{1}{2}$ -lb. caustic soda (95 per cent.) in 2 gallons of water, boil, add 2 lb. resin, and about $\frac{1}{2}$ -pint of fish oil, keep boiling for two to three hours, add slowly, stirring all the time, 3 gallons boiling water, and finally enough cold water to make 8 gallons of wash. The wash can be applied still warm.

Many of the preparations enumerated are also used for the destruction of parasites and vermin on domestic animals. Sheep, for instance, require regular dressing with an insecticide, by either bathing, dipping, or smearing, in order to prevent the attacks of insects, to destroy insects and also their eggs. **Non-poisonous and poisonous sheep' dips** are used, the former consist chiefly of carbolic acid (Phenols) and similar chemical compounds, soft soap, and also

frequently some sulphur compounds. Such dips kill the insects, but do not destroy the eggs, and frequent dippings are necessary. Poisonous dips kill both insects and their eggs; they contain arsenic in a soluble form, and also frequently the compounds found in non-poisonous dips.

Dipping with poisonous insecticides is largely used for the destruction of cattle ticks; and, so far, from experiences gained in this State, solutions containing not less than $\frac{1}{5}$ per cent. or '2 per cent. of arsenic are found most effective. Small amounts of soap and Stockholm tar are generally added to the solutions to make them more adhesive. The solution used for dipping cattle is prepared by boiling arsenic and caustic soda dissolved in water until the whole of the arsenic has dissolved in form of sodium arsenite. In another portion of water Stockholm tar, tallow, and caustic soda are boiled until the whole of the tar has been dissolved, and this solution mixed with the arsenical solution and made up to such a volume as to contain not less than 8 lb. of arsenic per 400 gallons of fluid. As the method of preparation is not quite simple, and somewhat dangerous, on account of the arsenical fumes given off during boiling, ready-made dipping concentrates are put on to the market by several manufacturers, which concentrates simply require to be diluted with water to be ready for use. *Smearing* the animals with crude kerosene oils is used largely in some of the American States instead of dipping.

Fumigation.—The destruction of all classes of insects by fumigation has become very general, and more particularly the treatment with **Hydrocyanic acid gas** (prussic acid). The trees, shrubs, plants, or fruit in cases, to be treated, are covered with a gastight sheet or tent, or are placed into an airtight room, which space is then filled with the highly poisonous fumes of hydrocyanic acid, generated by allowing dilute sulphuric acid to act on potassium or sodium cyanide. The treatment of trees should be carried out at night or on dull cloudy days, and the leaves and fruit should be fairly dry. If the amount of gas generated is too great, young shoots of the trees will be injured. The gas is allowed to act from fifteen to forty-five minutes, according to the size of the trees. For a space of 1,000 cubic feet 4 oz. of potassium cyanide (98 per cent.), 4 fluid oz. of strong sulphuric acid (oil of vitriol), and 12 fluid oz. of water are required. The water is poured first into an earthenware dish (or lead-lined wooden box), and the sulphuric acid slowly and cautiously added, finally the cyanide, previously broken into lumps (of about $\frac{1}{2}$ -oz. size), is thrown into the dish. The gas is generated very rapidly, and the operator must take great care not to breathe when adding the cyanide.

This fumigation is also used for the destruction of all kinds of vermin, cockroaches, silver fish, moths, bugs, &c., in houses, railway carriages, ships, flour mills, and other buildings, but the gas is generated about twice as strong. For every 1,000 cubic feet of space use 9 oz. of cyanide, 12 fluid oz. of sulphuric acid, and $1\frac{1}{2}$ pint of water. Only the best cyanide, containing 98 per cent. of KCN or NaCN, should be used. Sulphuric acid is the ordinary strong commercial acid of 1.83 specific gravity. The gas should be generated in earthenware or china vessels, or in wooden tubs, or best in lead-lined boxes. It will be found most convenient to use a 3-gallon vessel for about 3 lb. of cyanide, 4 pints of sulphuric acid, and 6 to 8 pints of water. This quantity is the most convenient to work with, and should not be exceeded; and if the room is too large use two or more charges, so arranged that the cyanide is dropped into the different vessels simultaneously. Fumigate on a calm quiet day. Make the building or rooms as gastight as possible, closing all cracks and openings, which is easily done by pasting papers on the outside over the openings. All machines, boxes, cupboards, elevators, &c., ought to be opened, and all unnecessary material removed and burned before the chemicals are used. A door or some window should be so arranged as to be easily opened from the outside, to allow the gas to escape after the fumigation is finished. If several rooms on different floors have to be fumigated, shut each room or floor off from the others, and always start operations on the top floor. Allow for a ready escape

of the operator. Let the gas act in the room or building as long as convenient, at least from twelve to twenty-four hours. Open the building, and allow the air to enter at least one hour before anybody is permitted to enter the building. In very close and badly ventilated rooms and airtight enclosures, a longer time may be required to get rid of all the poisonous gas, and no room should be entered if the peach-like odour of the gas is very pronounced.

Carbon bisulphide is also largely used as a fumigating agent, and is particularly useful for the destruction of root insects, like phylloxera of grape vines, and the grubs in sugar-cane stools, in which cases the fluid has to be injected into the ground. This chemical is also very extensively used for the destruction of insects living in grain, like weevils, &c., which are simply enclosed in airtight receptacles, like ship tanks, iron drums, &c., to which, after filling them with the grain, some carbon bisulphide, at the rate of 1 fluid oz. for every 20 gallons or 125 cubic feet of space, is added. The liquid is very volatile and highly inflammable, and, therefore, the greatest care has to be taken that no fire of any form comes near it.

If the bisulphide of carbon is of poor quality, if it is used in excess or too frequently, the germinating power of the seeds may be injured, which also happens if the vessels in which the seeds are stored are kept absolutely airtight for any very long period. The disagreeable odour of the grain treated disappears very quickly on exposure to the air.

Benzene and gasolene may also be used in a similar manner, but they do not act quite so powerful as carbon bisulphide.

A very large number of plant diseases are caused by various **fungi**, and for the destruction of these **fungicides** have to be used—chemicals which are generally plant poisons, but are used in such strength only so as to kill the lower forms of vegetable life, but not the higher plants.

Various *mineral salts*, chiefly copper salts, are used as fungicides, and the principal preparations are copper sulphate, Bordeaux mixture, and Eau Céleste.

Copper sulphate is used as a dressing of seed wheat for the prevention of the fungoid diseases—rust, smut, and bunt. The seeds are thoroughly moistened, about twenty-four hours before sowing, with a solution of 1 lb. of copper sulphate in 2 gallons of water.

Bordeaux mixture is the most important fungicide; its active ingredient is copper hydroxide $\text{Cu}(\text{OH})_2$, which is obtained by adding milk of lime to a solution of copper sulphate. The solution can be used much stronger (double the strength) in winter than in summer. It is prepared as follows for summer dressing:—

(a) 6 lb. of copper sulphate are dissolved in 20 gallons of water in a cask, which is easily done by suspending the copper sulphate enclosed in a coarse sack near the surface of the water.

(b) 4 lb. of good fresh quicklime are slaked in another tub by pouring about 3 to 4 pints of water over it. When all the lime has been well slaked, 20 gallons of water are added, stirring well to form a thin milk of lime. This milk of lime must be strained through a fairly fine sieve or through coarse bagging. If much refuse of gravel and stones is left, more lime may have to be used, up to 6 or 7 lb.

(c) The milk of lime and the copper solution are poured simultaneously into a large barrel. This manner of mixing is of importance, as otherwise the proper formation of copper hydroxide would not take place. The copper must not be in excess in the finished liquid, which is easily ascertained by plunging a clean knife blade into the mixture, which should remain untarnished; an excess of copper is indicated by copper being deposited on the blade, and in this case more milk of lime has to be added, as otherwise the solution would have a corrosive action on the foliage.

In this strength the mixture may be used for melanose, black spot of citrus fruits, and various other fungi attacking branches and stems of such trees. It

is also used for many diseases affecting grape vines, and as a preventive against potato blight, by spraying the potato plants several times with a somewhat weaker solution (4 lb. copper sulphate, 4 lb. of lime to 50 gallons of water).

Eau Celeste is the well-known deep-blue solution formed by the addition of an excess of ammonia to a copper sulphate solution.

Ammoniacal copper carbonate is made by dissolving copper carbonate in ammonia; this and the former preparation act very similarly to Bordeaux mixture.

Ferrous sulphate (green vitriol, copperas) is also used as a fungicide, more particularly as a preventive against black spot or anthracnose of grape vines. Strong solutions, containing from 4 to 8 lb. of the salt per gallon of water, are used. The wash is very much improved by the addition of about 1 to 3 per cent. of sulphuric acid. As a preventive, the solution must be applied towards the end of winter, before the buds swell.

Sulphuric acid by itself as a 10 per cent. solution is used for the same purpose, and it is prepared by adding $\frac{3}{4}$ -pint of strong commercial sulphuric acid slowly and carefully to 1 gallon of water. If the disease of anthracnose is very prevalent in the district, the winter dressing with either of last two solutions must be followed by spraying with Bordeaux mixture before the blossoms open.

Sulphur, in the form of dry fine powder (flowers of sulphur), is useful as a fungicide, particularly for mildew on roses and other plants.

Sulphur and lime wash is frequently used as an excellent paint for the trunks and main branches of trees, and it is prepared by boiling 2 lb. of sulphur and 1 lb. of stone lime (quicklime) with 2 gallons of water for $1\frac{1}{2}$ hour, then adding 3 lb. more lime, and boiling for half an hour more. The original volume of 2 gallons is made up with water, and some fine flour or fine clay is added to make the whole into a consistency of thin paint.

Potassium sulphide (liver of sulphur, potassium sulphuret) is used as a spray in solution of $\frac{1}{4}$ to 1 oz. to the gallon of water for mildew on roses, smut, and various leaf blights and scabs.

Formaldehyde is largely used for the prevention of smut in oats and bunt of wheat, by soaking the seeds for two hours in a solution containing 1 lb. of **formaline** (a 40 per cent. formaldehyde solution) in 50 gallons of water. The solution should not be used much stronger, as the germinating powers of the seeds may be destroyed.

Mercuric chloride, corrosive sublimate, is one of the most powerful fungicides, and is extremely poisonous. For the treatment of seed wheat and other seeds a solution of 1 lb. in 50 gallons of water is used.

Nearly all the fungicides enumerated are plant poisons, and when used stronger than recommended will kill all vegetation, and may, therefore, be used for the **destruction of weeds**. The simplest and quickest weed-killer is a solution of **arsenite of soda**, applied in a strength of at least 1 per cent. solution, which is easily prepared as follows:—

2 lb. of caustic soda (95 to 98 per cent.) are intimately mixed with 4 lb. of white arsenic, and 1 gallon of water is added very gradually to the mixture. Great heat is evolved, and the water will boil of its own accord. The arsenic should be all dissolved on stirring the mixture, but, if not, a further heating to boiling point for ten to fifteen minutes may be necessary. This strong solution is, before being used as a spray, made up with water to 40 gallons.

Any of the commercial dip concentrates may also be used as weed-killers, by diluting them with only one-fifth of the volume of water recommended for the preparation of dipping fluids. For instance, Queensland cattle dip concentrate is made up by using 1 gallon of the concentrate to 30 gallons of water for the use as weed-killer; whereas, for the purpose of killing ticks, the concentrate has to be diluted with 160 parts of water; similarly, of royal dip 1 gallon is

diluted with 40 gallons of water; and Alderson's dip, 1 part with 60 parts of water, when they are to be used for the destruction of weeds.

The arsenical solution may be successfully used for the destruction of grass and weeds on walks and courtyards, for the eradication of prickly pear, bracken, and undergrowth. Care must be taken that cattle are kept away from the places where the solution has been applied.

For the destruction of weeds on walks, a strong brine solution, applied hot, may also be used, and a strong solution of sulphuric acid, 1 part to 15 parts of water, will kill grass and weeds.

QUESTIONS TO THE TWENTY-THIRD LESSON.

1. Which substances are principally used as insecticides and as fungicides?
2. What is of importance in the composition of all arsenical preparations used as sprays to kill insects?
3. Into what classes may insecticides be divided in accordance with their use?
4. How may parasites and insects on animals be destroyed?
5. Describe the fumigation of trees with hydrocyanic acid gas, and what precautions have to be observed in the operation.
6. What chemical may be used for the destruction of insects and grubs living on the roots of plants?
7. What is the cause of most plant diseases?
8. How is Bordeaux mixture prepared?
9. How must seed wheat be treated to prevent rust and smut?
10. How have grape vines to be treated to prevent anthracnose?
11. What chemicals can be successfully used for the destruction of weeds?
12. How is a good kerosene emulsion prepared?

Statistics.

COMMONWEALTH METEOROLOGY. RAINFALL OF QUEENSLAND.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

STATIONS.	1907.									1908.			
	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Fe .	Mar.	April.
<i>North.</i>													
Bowen	0.39	3.46	2.87	Nil	1.28	0.51	0.06	3.71	6.39	10.14	5.63	9.46	3.73
Cairns	3.35	8.65	4.45	0.12	0.39	1.35	0.68	5.35	28.33	27.02	8.03	20.60	5.99
Geraldton	6.08	21.91	8.54	2.39	4.66	1.36	1.42	6.45	33.82	44.39	13.27	39.00	14.23
Herberton	0.90	1.57	2.71	Nil	0.11	0.12	0.17	3.41	9.57	9.29	5.02	8.92	1.40
Hughenden	0.16	1.34	0.95	1.16	Nil	Nil	1.66	0.66	7.75	0.98	5.18	6.91	0.30
Kamerunga State Nurs.	2.80	9.33	5.29	0.13	1.15	1.19	0.53	2.76	29.82	...	7.47	...	...
Mackay	1.58	*6.09	5.04	0.27	0.25	0.12	0.12	5.76	9.70	9.28	3.83	17.43	14.82
Rockhampton	0.44	0.94	4.16	0.84	0.47	Nil	0.47	3.72	4.42	3.84	9.64	9.77	2.62
Townsville	1.03	3.11	2.38	Nil	0.07	0.14	0.03	2.82	24.26	12.21	6.69	9.03	0.38
<i>South.</i>													
Biggenden State Farm	0.34	4.02	5.24	1.51	0.96	0.24	1.99	2.50	5.55	...	9.82	...	2.97
Brisbane	0.45	4.75	2.91	0.39	0.79	0.10	1.37	4.25	3.21	2.80	8.43	18.19	2.45
Bundaberg	0.38	3.08	4.49	0.87	0.43	Nil	1.70	2.90	2.99	4.77	2.82	7.35	4.13
Dalby	0.20	2.26	2.35	0.87	0.71	0.15	0.69	5.18	1.44	0.17	4.88	7.61	0.11
Esk	0.22	5.42	2.66	0.54	0.81	0.57	0.50	3.76	3.72	2.61	10.06	17.04	2.83
Gatton Agric. College	Nil	2.80	1.85	0.54	0.56	0.15	0.71	3.01	4.55	...	3.38	10.74	...
Gindie State Farm ...	Nil	Nil	2.29	1.58	0.10	0.16	0.61	1.57	4.42	0.20	7.17	...	...
Gympie	1.12	3.84	3.77	0.80	0.17	0.47	1.20	3.05	5.49	6.26	11.77	80.8	1.87
Ipswich	0.12	3.43	2.22	0.30	0.43	0.05	0.78	4.45	3.40	1.32	6.63	13.77	2.71
Maryborough	1.25	3.21	6.05	0.64	0.93	0.25	2.74	3.49	5.81	5.62	8.07	11.40	2.52
Roma	0.42	0.27	2.47	1.03	0.42	0.04	1.04	3.70	2.51	0.04	6.38	2.51	0.22
Tewantin	1.87	7.16	7.61	1.48	0.95	0.55	1.05	3.12	7.36	10.42	12.47	14.39	7.59
Warwick	0.51	1.58	1.27	1.16	1.37	0.01	1.37	3.25	3.13	0.76	4.52	6.65	1.40
Westbrook State Farm	0.02	2.53	2.53	1.04	1.78	Nil	1.08	4.76	3.23	...	...	...	...
Yandina	...	4.83	6.98	1.15	0.68	0.80	1.44	2.87	3.05	...	...	16.62	5.45

NOTE.—The rainfall data in this table are compiled from telegraphic reports, and must be considered approximate only.

GEORGE G. BOND,
Divisional Officer.

Vegetable Pathology.

"BLACK SPOT" DISEASE OF THE GRAPE VINE AND ITS TREATMENT.

By H. TRYON, Entomologist and Vegetable Pathologist.

The disease of the vine known in Australia as Black Spot, and originally identified by the writer with the *Anthracnose* (French) and *Schwarze Brenner* (German) of European vignerons (*vid.* Tryon, H.—Insect and Fungus Pests, pages 165-8, Brisbane, 1889), is, as was formerly pointed out, due to the attacks on the living tissue of either wood, leaf, tendril, flower stalk, or fruit of a minute parasitic fungus, technically designated *Glæosporium ampelophagum* (or *Sphaceloma ampelinum*).

The external features as well as the character of the injuries connected with "Black Spot" or "Anthracnose" are too well known to need description here, and the minute fungus organism that occasions it is so little patent to observation that further reference to it may be omitted after stating that the spores or seeds that it sheds, and whose presence constitutes the dull reddish grey centres of the "spots," are so small that it would require nearly 500 placed end on and touching one another to cover a single inch of extent.

The treatment of this malady is in great part a preventive one, and in its details has reference to the following facts relating to the dissemination of the latter:—

1. Its first introduction into a district, or even into a vineyard, is almost always effected through the medium of cuttings which, if they do not exhibit the characteristic markings that it has occasioned, at least may harbour the fungus germs (spores).

2. Its continuance in a vineyard from one season to another is dependent upon the persistence of the fungus parasite in a living condition, and in either its seed-bearing or vegetable condition, on or closely within the surface of the ripened wood.

Its virulence as a disease is dependent upon successive infection of one part after another of the growing grape vine as spring and summer proceed, its onset and progress being favoured by humid conditions and a variety of grape vine especially susceptible to its attack. Whence it happens that the disease exists permanently in the coastal districts of the State, whilst in more western localities only occasionally, as a seriously injurious malady; and, under both conditions, certain kinds of grape vine escape its attacks.

Measures of prevention may accordingly be divided into such as deal with the—

1. Disinfection of cuttings;
2. Winter treatment of pruned stocks;
3. Summer treatment of growing plants; and
4. Choice in planting of little susceptible varieties.

1.—TREATMENT OF CUTTINGS.

(a) These, when planting is contemplated, should be procured from a place where black spot disease or Anthracnose has not occurred during the past season, or at least from vines that have not been the object of its attack.

(b) If, when received, they exhibit the peculiar brand-like marks that are characteristic of the presence of the disease, they should not be used for planting, but rather be burnt forthwith; and

(c) In other cases they should be disinfected to destroy germs possibly adherent to them. This may be accomplished by steeping them in a carbolic

acid bath (2 oz. in 4 gallons—1 kerosene tin full—of water) or in a potassium sulphide one (4 oz. in the same quantity of water) for from 10 to 15 minutes. In the latter case, a wooden vessel—cask, for instance—should be employed.

2.—WINTER TREATMENT OF VINE STOCKS.

This treatment should take place after the vines have been pruned, and *whilst the buds are quite dormant*, no growth as yet being evident. It should consist in the following procedures:—

(a) The prunings to be removed and burned, and the resulting ashes restored to the plants.

(b) The stems to be rubbed by the hand, enclosed in a coarse glove—made of bagging or some such substance—so as to remove all loose bark (some purveyors of gardeners' requisites stock a special glove for this purpose).

(c) The whole of the parts above ground to be painted or mopped with commercial sulphuric acid and water of 10 per cent. strength—*i.e.*, with a mixture composed of 1 lb. of acid in 10 lb. (1 gallon) of water. This dressing must be made and conveyed in a wooden, earthenware, or enamelled vessel, since metal receptacles would be corroded by it unless coated with anti-acid paint. With regard to adjusting the proportion of acid and water, it has been pointed out that, as a reputed quart wine or whisky bottle holds $\frac{1}{6}$ -gallon—*i.e.*, 3 lb.—of acid, a third of its contents will be the measure of acid required for every gallon of water.

In mixing the acid and water, the former must be gradually added to the water, and not the water to it, otherwise spurting, with consequent injury to the person, may result.

The application may be made with rather a large-size brush, composed of bristles or horse hair, or with a rag mop, the handle in each case being fairly long. Inasmuch as this acid application is destructive to clothing if shed upon it, and is also "rough on" the skin, care should be taken to avoid splashing, and the operator should be clad in old garments whose injury is not a consideration.

In France a special knapsack spray pump is employed for this, and an equally corrosive winter dressing.

Going over, in the manner described, one or two vines of average dimensions with simple water will afford an insight into the quantity of sulphuric acid required for treating an entire vineyard or any definite portion thereof.

When first making known to Australian vignerons, twenty years since, the nature, cause, and mode of treatment of Grape Vine Black Spot Disease, the writer recommended the use of a strong acid sulphate of iron solution in lieu of sulphuric acid and water for this winter application. This is still the most favoured one in France, and is composed of *sulphate of iron*, 50 parts; *water*, 100 parts; and *concentrated sulphuric acid*, 1 part. Unless, however, the climate be a moist one, some danger to the vine may result from its application.

SUMMER TREATMENT.

Notwithstanding the procedure above described has been carried out, some living spores of the Black Spot fungus may survive in a vineyard to cause the infection of the early growth, or this may be effected through access to it of wind-borne spores derived from untreated vines elsewhere. Accordingly, the winter treatment should be followed up by a spring and summer one. This consists in spraying the vines with Bordeaux mixture (copper sulphate or blue-stone, 6 lb.; lime, 8 lb.; water, 40 gallons) or soda Bordeaux mixture (in which soda in equal amount is substituted for lime). The preparation of Bordeaux mixture has been so often described that it need not be repeated here, but directions for its manufacture can be furnished on application. It may, however, be pointed out that, as soon as the first signs of "Black Spot" are evinced,

by the appearance of dark corroded markings on the young growth, its application should be commenced. Moreover, since this fungicide only protects the parts to which it adheres, the application should be renewed every two or three weeks as additional growth is produced or removal through rain has been effected. It requires to be administered by means of a spray pump with atomising nozzle attached to the delivery tube, in the form of a fine mist. A little soapy water added to the mixture will promote both the spreading and adherence of the tiny droplets. Freshly prepared Bordeaux mixture always produces better results than such as has been held over from an earlier application and is accordingly "stale."

Insomuch as has been remarked, the summer treatment described involves the use of a spray pump, and this may not always be available. A dry application of sulphur or of sulphur and lime may be substituted for it, but with less efficaciousness. This is applied in the ordinary way for sulphuring grape vines for *Oidium* or Powdery Mildew. The sulphur should be very finely ground (flower sulphur), or, preferably, of the kind known as flowers of sulphur, and in either case should be acid to the taste. The latter form is the more costly, but since it is the bulkier, weight for weight, its use involves little more monetary outlay than does that of ground sulphur. The lime should be well air-slaked, to prevent any damage to the coming crop through its caustic action, although, except in the case of flowers and very small berries, injury from it is scarcely to be anticipated. For the first application sulphur alone may be used, and to this, for subsequent ones, the lime may be added till it constitutes three-fifths or more of the bulk of the mixture.

Reference has been made to a special susceptibility to Black Spot disease manifested by particular vines. It has, however, been found that, even in the Brisbane district where *Anthraco-nose* is constantly prevalent, these vines can be grown successfully, and made to produce good sound crops, by careful resort to the winter and summer treatments alluded to. This is a consideration of some importance, since it also happens that the more susceptible varieties are those that generally produce the most esteemed and most valuable fruit. I have ever felt proud of the day when, through my investigations, both the nature of and remedy for this serious vine disease were first made known to the Australian vigneron in 1889.

EARACHE AND ITS CURE.

"I am afraid I have greatly interfered with my own practice," said a celebrated aurist, "by giving the following advice to many of my friends:—At the first symptom of earache, let the patient lie on the bed with the painful ear uppermost. Fold a thick towel, and tuck it around the neck; then, with a teaspoon, fill the ear with warm water. Continue doing this for fifteen or twenty minutes; the water will fill the ear orifice and flow over on the towel. Afterwards, turn over the head, let the water run out, and plug the ear with warm glycerine and cotton. This may be done every hour until relief is obtained. It is an almost invariable cure, and has saved many cases of acute inflammation. The water should be quite warm, but not too hot."

Animal Pathology.

TICK, REDWATER, OR TEXAS FEVER IN CATTLE.

The following report on tick fever was written, at the request of Sir Horace Tozer, K.C.M.G., Agent-General for Queensland, by Professor Robert Wallace, Professor of Agriculture and Rural Economy in Edinburgh University:—

Tick fever, probably best known by the misleading name of Texas fever, has a substantial foothold on all the great continents of the world. A few of its numerous names are—splenic, tick, Spanish, and southern cattle fever; murrain in the United States; “tristeza” in the Spanish countries of South America; “ranilla” in Mexico; acclimatisation fever in Cuba; and redwater fever in Australia and South Africa. A variety is also known in South Africa as East Coast fever. In the States this disease was known in 1814 to be produced among northern cattle after they had mixed with cattle from certain districts of Carolina. A peculiarity of the fever is that the animals which indirectly spread the infection “are apparently in good health, while those that sicken and die from it do not, as a rule, infect others.” Known for centuries in the old world, it has within a few years extended to new areas—notably in Australia, in Africa, and in South America—and in each instance in a southern direction from the warm, humid regions of the tropics into the intermediate zone south of the equator and north of the cold or dry region, where the cattle tick which carries the parasitic cause of the disease cannot maintain its existence.*

Texas, an important cattle-breeding and exporting State, is by far the largest of the southern States of America which are within the infected area. Its serious annual loss (although less by fever directly than by the dislocation of the cattle industry), the retardations to improvement in cattle-breeding, and the restrictions necessary in the interest of healthy cattle outside, attracted the attention of the Agricultural Department at Washington. An exhaustive inquiry into the nature of the disease and the life history of the tick was instituted through the Bureau of Animal Industry of the department in 1888, and its results, with those of State investigations which followed, have been a trustworthy guide to all deeply interested in other parts of the world. Experiments have been carried out in other countries; but they have in all essential particulars merely confirmed the American results, with slight variations due to local circumstances. The discovery of the minute micro-parasite, *Piroplasma bigeminum* or *P. bovis*, the cause of the specific fever, was made in 1889 by Dr. Theobald Smith, an expert of the Bureau of Animal Industry; and the same year Dr. F. L. Kilborne discovered that the cattle tick,† *Boophilus annulatus* (Stiles and Hassall), (*Ixodes bovis* (Riley), *Boophilus bovis* (Curtice), are synonyms) was the intermediate host of *bigeminum*, and the only natural carrier of this the cause of the disease.‡

* “In Australia, Texas fever was first observed about 1885 in the northern part of the continent. . . . In South Africa it was first introduced about 1870. . . . Lignières reports Texas fever in Argentine in 1890; it was reported from the Philippine Islands in 1903; and Lingard states that it has been recognised in India since 1871.”—Mayo.

† “This tick is found principally on cattle, less frequently on horses, mules, and asses, and in one case it was found on a deer.”—Cary.

‡ See Bulletin No. 1 of the Bureau of Animal Industry, U.S. Department of Agriculture, “Investigations into the Nature, Causation, and Prevention of Texas or Southern Cattle Fever,” by T. Smith and F. L. Kilborne, published at Washington, D.C., 1893.

A list follows of pathogenic ticks and the countries where they are found, kindly supplied by Dr. Geo. H. F. Nuttall, F.R.S., Quick Professor of Biology, Cambridge:—

Carriers of Redwater (*Piroplasma** *bigeminum* or *P. bovis*).—1. *Boophilus annulatus*, North America; 2. *Boophilus australis*, Australia, North and South America, Japan, Africa; 3. *Rhipicephalus decoloratus*, Africa; 4. *Ixodes ricinus*, Europe, North America (always found associated with the disease in Europe, but not demonstrated); 5. *Rhipicephalus capensis*, Africa; 6. *Rhipicephalus evertsi*, Africa. (Koch observed development of *Piroplasma* in this species.) 7. *Hyalomma aegyptium* (suspected, Koch observed development of *Piroplasma* in it).

Carriers of Rhodesia or Coast Fever (*Piroplasma parvum*).—1. *Rhipicephalus appendiculatus*, Africa; 2. *Rhipicephalus simus*, Africa; 3. *Boophilus annulatus*, var. *calcaratus* (carries *P. parvum* in Caucasus, Dschunkowski).

Carriers of *Piroplasma canis*.—1. *Hamaphysalis leachi*, Africa; 2. *Rhipicephalus sanguineus*, South Europe, Africa, India, West Indies, &c. (All over the world.)

Carrier of *Piroplasma ovis*.—(Sheep) *Rhipicephalus bursa*, South Europe, North Africa.

Carrier of *Piroplasma equi*.—(Not known).

Carrier of Heartwater in Goats and Sheep.—*Amblyomma hebraeum*, Africa.

Messrs. William Cooper and Nephews, of Berkhamsted, England, who have conducted extensive experiments on tick infestation and its consequences at their estate of Gonubie Park, East London, say:—"Ticks in South Africa cause redwater and Rhodesian fever and heartwater in cattle; heartwater in sheep; biliary fever in horses; piroplasmosis in dogs; and various other diseases. Heartwater is particularly serious, because it attacks both sheep and cattle. In addition, the bont tick (*Amblyomma hebraeum*), which conveys heartwater, does not remain on the same host through all its stages as does the ordinary blue or redwater tick (*Rhipicephalus decoloratus*). It is so hardy that no amount of starving—that is, keeping the stock off the land—will cause its disappearance. Sheep in the East London district will not live longer than three or four weeks when affected. Heartwater is very fatal to calves, and some authorities place the death rate as high as 60 per cent. of deaths before the calves are six weeks old."

Inoculation by anti-serum being of no practical value as a preventive of redwater, the first successful blood inoculation experiments were made between 1895-1900 by Drs. M. Francis, V.S., Texas, and J. W. Connaway, V.S., Missouri. The relative immunity obtainable in susceptible cattle (or, in other words, those born and reared on land not infested with *Boophilus annulatus*) has also been secured by the veterinary surgeons of most of the other southern States in which the disease is endemic—i.e., by Drs. C. A. Cary, Alabama; C. F. Dawson, Florida; C. L. Willoughby, Georgia; W. H. Dalrymple, Louisiana; J. C. Roberts, Mississippi; Tait Butler, North Carolina; G. E. Neson, South Carolina. Full details of the results have been published. The loss by death among the first approximately 5,000 animals treated varied considerably at the different centres—from none to 11.5 per cent.—the average being 7.55 per cent. Dr. Nelson S. Mayo, Vice-director and Chief of the Department of Animal Husbandry of the Central Experiment Station of Cuba, also issued, in April, 1907, the results of much useful work in the field of tick fever investigation. (Bulletin No. 6.) †

* First named *Pyrosoma*; also spelt *Pyroplasma*.—R. W.

† To these authorities' publications, as well as to those of the Bureau of Animal Industry at Washington, indebtedness is acknowledged.

The object of inoculation is to introduce the fresh blood of an immune animal containing the disease-producing organisms into the blood of a susceptible animal, and thus occasion a mild attack of fever, not acute enough to cause death, but real enough to bring about the desired result. Young cattle are more likely to recover than old ones, and the operation is best performed when or before they are two years old.

The parasitic micro-organism which is the origin of all the mischief is somewhat similar to those producing malarial fever in man. In Cuba and in



DIAGRAM NO. I.

The parasitic micro-organism found in the red corpuscles of the blood of an animal which died of Texas fever. Fig. 1 shows an intra-globular parasite in subcutaneous blood taken a few hours before death—one of a group of organisms which show very marked changes in outline. The sketches of magnified blood corpuscles contain individually a nuclear (?) body, the lower row being taken from fresh cutaneous blood shortly after death.—From the “U.S.A. Report on Texas Fever, 1893.”

South America the disease is sometimes designated yellow fever. The organism is a protozoon, which at times “has the power of changing its position and form while under observation.” It is generally pear-shaped, and found two together within one red blood corpuscle—the pointed or “stem” ends converging and then occupying about a fourth of the cubic space of the cell. It multiplies very rapidly on gaining admission to the blood of a bovine animal. It is not easily found in the external circulation, but it is numerous in the spleen and in the “blood of the tissues of the heart, liver, and kidneys.” In acute cases it rapidly destroys the red blood corpuscles in which it harbours; and, the resulting hæmoglobin, making its escape from the animal’s disorganised system, is frequently present in such quantities in the urine that it has given origin to the name Redwater Fever. It is the process of ejecting the cell *débris*, much more than the loss of blood corpuscles, that causes the rise of temperature and the congestion of the affected organs.

Drs. Geo. H. F. Nuttall and G. S. Graham-Smith, writing from the Pathological Laboratory, Cambridge University, on an exhaustive series of their experiments on “Canine Piroplasmiasis” in “The Journal of Hygiene” for October, 1906, and again in April, 1897, describe as follows the asexual cycle of development within the peripheral blood of the *Piroplasma canis*, which, being nearly related to the organism producing Texas fever, probably goes through a similar process of development:—*“A free pyriform body which has just left a blood corpuscle enters another corpuscle and soon assumes a round form, usually remaining quiescent for a time. The round body then becomes actively amœboid and grows. After a longer or shorter time it either assumes a pyriform shape, and escapes from the cell to repeat the process, or it divides and gives rise to two or more pyriform bodies, which are for some time joined together by a thin process or processes, but ultimately become separated, escape from the corpuscle, and invade other corpuscles. The invaded corpuscle ruptures and disintegrates after the escape of the parasite.” (Diagrams II. and III.)

* Since the foregoing was written, Prof. Nuttall informs us that he has observed the same mode of multiplication in *P. bigeminum*.

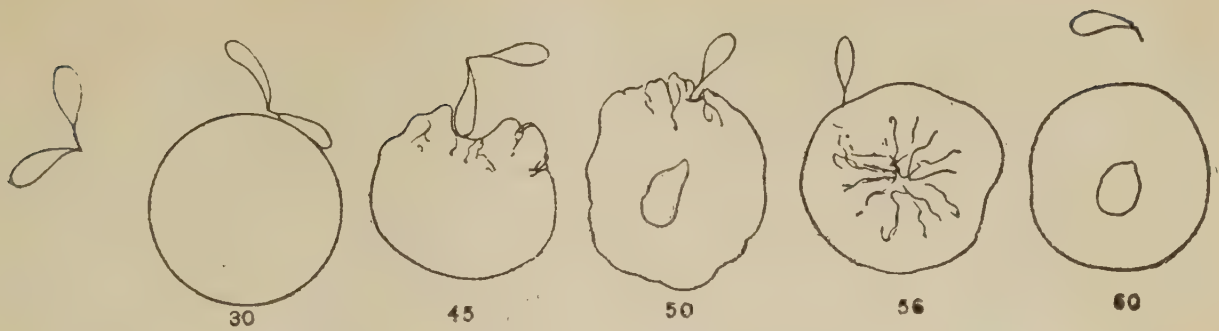


DIAGRAM NO. II.

"Serum containing numerous free parasites was obtained from an infected dog shortly before death, and added to a small quantity of normal dog's blood. Shortly after the preparation was made two pyriform parasites, joined by their pointed ends, were noticed swimming free in the fluid between the corpuscles, and frequently altering their relative positions to one another. Fifteen minutes later one of the pair applied itself by its side to the edge of a corpuscle, while the other swung freely (30'). In this condition they remained for fifteen minutes, when the applied parasite rapidly changed its position and indented the corpuscle with its blunt extremity. Very violent movements then occurred, during which the side of the corpuscle was greatly distorted, but after five minutes the parasite passed into the corpuscle (50'), leaving the other with its apex attached to the distorted wall of the corpuscle. Soon afterwards the edge of the corpuscle became well defined, but the surface of the central portion was still disturbed by the movements of the internal parasite (56'). Shortly afterwards all motion ceased, and the corpuscle resumed its normal appearance, but showed a rounded parasite within it. Shortly before this the other parasite became free and swam away. It attacked another corpuscle but did not enter it."

In Fig. 12, Diagram III., the at one time single mass of chromatin has nearly divided, "but the resulting masses are still connected by a thin strand. At this stage a change takes place in the appearance of the strands of chromatin passing down the processes. They lose their definite contour, and become transformed into masses of loose chromatin with a reticular structure." In this no vacuole, which is sometimes observable, is present. "The upper row of figures represents the appearances which are seen when the terminal portions

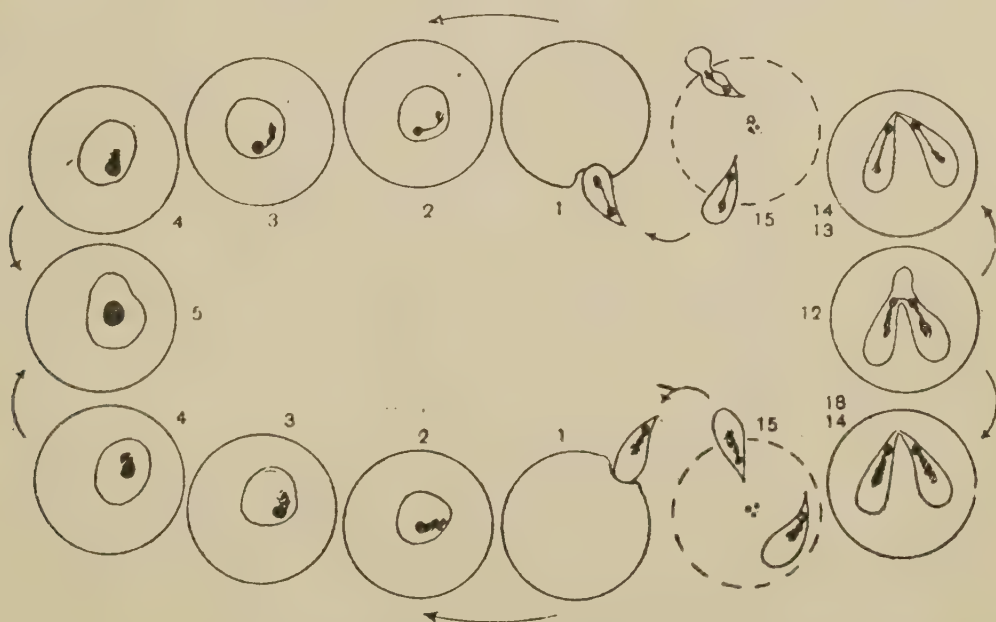


DIAGRAM NO. III.

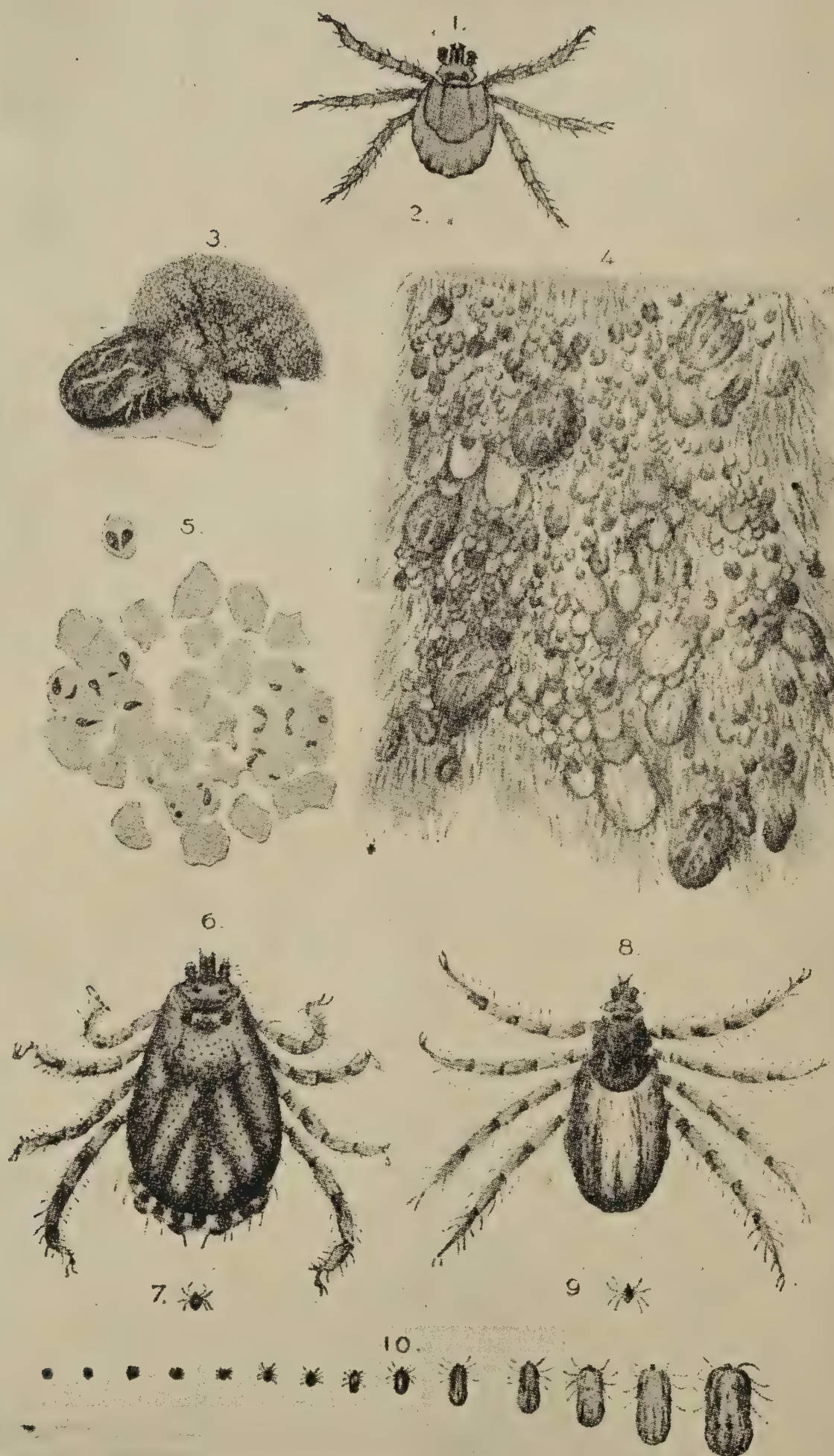
Diagrams II. and III. reproduced by permission of the Cambridge Press from "Canine Piroplasmiasis," V. and VI., by G. H. F. Nuttall and G. S. Graham-Smith, in the "Journal of Hygiene," for October, 1906, and April, 1907.

only of the strands of chromatin, which pass down the processes, are changed into reticular masses. In Fig. 14 the completely formed parasites of this type within the corpuscle are represented, and in Fig. 15 the rupture of the corpuscle and the escape of the parasites, one of which is in the hour-glass condition while passing through the corpuscular envelope. Figs. 1, 2, 3, 4, and 5 show the gradual condensation of the chromatin into a single mass after the entry of one of the parasites into a fresh corpuscle. In the lower row of figures the same series of events are represented in parasites without vacuoles, in which the secondary mass of chromatin forms a loose mass closely related to the dense mass."—Nuttall and Graham-Smith, "The Journal of Hygiene," page 260, April, 1907.

The conditions under which the corpuscles are destroyed vary extremely, and, so far, no typical temperature curve has been found. "Often in the acute stage of the fever (in cattle), with a temperature of 105 degrees to 106 degrees Fahr., the red cells show a reduction of only 20 per cent., while, during a later stage pending either death or recovery, a temperature of 101 degrees to 102 degrees is attended by a destruction as high as 75 per cent.; or the reverse may be noticed." In the last stages of the worst of fatal cases, after the temperature has gone down even to subnormal, few organisms remain in the corpuscles; but many are present in the blood plasma, especially of the kidneys. According to Schroeder, "in the ordinary immune cattle there is not over one parasite to several million corpuscles"; but one in fifty is a possible amount in fatal cases.

It has not been observed that any toxic substance is present, and as a result of the work done it is not believed there is one.

The organism is communicated to cattle by the bite of the larval (*Boophilus*) or adult (*Rhipicephalus*) tick, which fixes itself by its mouth-parts to the skin, and swells up to a large size, by sucking the blood of the host. The female is accompanied by one or two relatively small males, which shelter under her. When gorged with blood she loses hold, and drops to the ground in a relatively helpless condition; but she may crawl a short distance to the nearest shelter, where after a few days' rest she begins to lay from 1,500 to 4,000 eggs, a task which she accomplishes in from six to fifteen days, meanwhile becoming wrinkled. She then dies. If conditions be unpropitious, as in winter, the eggs lie dormant till spring; but if favourable, hatching may occur within twelve to thirty days into minute, active six-legged "seed ticks" or "garrapatilla" (Spanish), which, if not able to find their way on to cattle, horses, or mules, "starve to death in one to four months in summer, and one to seven months in winter." To secure a position of vantage, and be ready to cling to the legs of passing animals, seed ticks climb and cluster on the highest points near, as on the stems or leaves of pasture plants. On gaining a foothold they crawl up, by aid of two small hooks at the termination of each limb, to positions of safety before they become attached, usually to the soft and thin-skinned parts, the escutcheon, the udder, inside the thighs, about the roots of the ears and tail, and on the dewlap. This is the stage at which their bite inoculates cattle with the organisms of tick fever, passed on to them by the breeding female through the eggs. In about six days the seed tick molts, and is transformed into a nymph with eight legs. In eight to twelve days more a second shedding of the skin occurs, and immediately after the female becomes pregnant. The male grows little more, but the female swells steadily for from six to twelve days, and finally becomes engorged during the last two or three days before losing her hold. "The shortest time of the life cycle is about thirty-five days in summer and six to eight months in winter" (see Plate). Dr. C. A. Cary thus tabulates the life history of the cattle tick in Alabama:—



CATTLE TICKS, AND THE TEXAS FEVER PROTOZOA THEY TRANSMIT TO CATTLE.

1. Larva of Cattle Tick ($\times 25$). 2. Same (natural size). 3. Mature Female and Eggs ($\times 2$). 4. Hide, showing Cattle Ticks (natural size). 5. Blood Cells (red corpuscles), containing Texas Fever Protozoa ($\times 1000$). 6. Male Cattle Tick ($\times 15$). 7. Same (natural size). 8. Young Female Cattle Tick ($\times 15$). 9. Same (normal size). 10. Various Stages of Cattle Ticks (natural size).—From Louis A. Klein's "On the Methods of Eradicating Cattle Ticks, U.S. Department of Agriculture, 1907."

	SUMMER (May to October).	WINTER (October to May).
1. Egg-laying time	6 to 15 days	30 to 60 days.
2. Hatching time	12 to 30 days	30 to 210 days.
3. Seed tick may live without getting on cattle	30 to 120 days	30 to 240 days.
4. After attaching to the skin of cattle, females mature and drop off in	15 to 35 days	25 to 60 days.

The plate shows cattle ticks and the Texas fever protozoa they transmit to cattle:—1. Larva of cattle tick ($\times 25$); 2. Same (natural size); 3. Mature female and eggs ($\times 2$); 4. Hides showing cattle ticks (natural size); 5. Blood cells (red corpuscles) containing Texas fever protozoa ($\times 1,000$); 6. Male cattle tick ($\times 15$); 7. Same (natural size); 8. Young female cattle tick ($\times 15$); 9. Same (normal size); 10. Various stages of cattle ticks (natural size).—From Louis A. Klein's "On Methods of Eradicating Cattle Ticks, U.S. Department of Agriculture, 1907."

The height of the tick fever season in North America is the latter half of August and the early part of September. The acute type of the disease occurs at this time, and is generally fatal. "Adult animals, particularly milch cows or fat cattle, nearly all die." A milder and slower non-fatal form appears late in autumn. When it occurs in July or early in August it is very liable to develop into the acute form and terminate fatally.

To prevent the transportation of ticks by cattle from the permanently infected southern States to the northern pastures, regulations are annually made by the Secretary of Agriculture. They define the northern boundary of the affected district, and stipulate "that no cattle shall go out of it except for immediate slaughter, between 1st February and 31st October." The open season to most of the States in which store cattle may be shipped north is between 1st November and 31st January. Danger is then reduced to a minimum, and "cattle become naturally free of ticks every winter in the northern portion of the quarantined area." All cattle have to be inspected and accompanied by a license; and, if they have not been dipped in oil to kill the ticks before starting, they must be shipped in cars marked "southern cattle," to a slaughter house or yard set apart to receive them.

The symptoms may appear after a period of exposure on tick-infested pasture of from thirteen to ninety days. Ticks, often quite small and difficult to locate, will be found on close inspection. With the acute form of the fever the animal suffers from extreme prostration and dullness, stops feeding and ruminating, and, walking with difficulty, falls behind its neighbours and lies down or stands alone, while its ears lop and its head hangs. The temperature rises to 106 degrees and 107 degrees Fahr., from the normal 101 degrees to 103 degrees Fahr. In mild prolonged cases the temperature may not exceed 104 degrees Fahr. Little change in temperature occurs until death or recovery is near. The pulse and respiration are abnormally rapid. Constipation is general, though not invariable, except towards the end of the fever, when also the red colouring matter appears in the urine. "As the end approaches, emaciation becomes very marked, the blood is very thin and watery, and the closing of any wound of the skin by clots is retarded. The animal manifests increasing stupor, and may lie down much of the time. Signs of delirium have been observed." Death occurs most frequently at night, and in from three days to, it may be, several weeks after the onset of the fever. The *post-mortem* examination shows yellow fat and thin watery blood. "The most important changes are noticed in the liver, spleen, kidneys, and bladder, other organs being practically normal." Recovery in perhaps 10 per cent. of the cattle affected in hot weather is extremely slow; and a second mild attack is very liable to occur in autumn. The mild attacks which originate in October and November are associated with so little fever that they easily escape observation. "If, however, the blood corpuscles be counted from time to time, a gradually diminishing number will be found, and after several weeks only about one-fifth or one-sixth of the normal number are present"; and the animal loses weight.

Apart altogether from the fever, "in biting into the skin to connect their sucking organs with the blood supply the ticks set up little areas of inflammation, and when the parasites are numerous the irritation thus produced is a cause of considerable worry. Young animals exposed to excessive tick infestation become stunted, weak, and more liable to succumb to disease; dairy cows give a reduced yield of milk, and beef cattle can only be fattened, if at all, at increased cost."—Klein.

Means are now successfully employed to induce animals liable to be exposed to dangerous infection by being introduced after they are past the very young stage to a tick-infested area, to take the disease in a mild form, and thereby to secure a condition of modified immunity or "a toleration of the parasite, that keeps the animal from suffering an acute attack." "However (says Cary), it is a condition of unstable equilibrium; and a slight environmental change, such as intense heat, severe exertion, adverse change of blood, or certain undetermined factors tending to lower the animal's resistance, or, on the other hand, a slight or considerable increase in the number of the invading organism, suffices to bring on acute and often fatal attacks of the fever.

. . . A cow, steer, or ox must have an attack of tick fever once every year or several times every summer, or its immunity is lost within two or more years. Just as a man can have a series of attacks of malaria, so may cattle have a series of attacks of tick fever. It is true that one cow has been known to carry the micro-parasite in her blood for thirteen years; but thousands and thousands of native southern cattle that have had one or more attacks of fever die every year from one severe attack or several attacks in one season."

The credit of the institution of a method of artificial immunisation is due to Dr. M. Francis, and Dr. J. W. Connaway, respectively of Texas and Missouri, the two States which have taken the lead in this branch of the investigations. Cattle of from eight to eighteen months old give most satisfactory results, and that in the cool period of late autumn or early winter months. Subcutaneous injections of a small amount of defibrinated virulent blood freshly taken from an immune tick-carrying animal are given two or three times, at intervals of three weeks; 1 cubic centimetre is the standard dose for an animal one year old, but a beginning may be made with less, and the amount increased each time. In place of 90 per cent. of loss, considerably over 90 per cent. of cattle in good physical condition recover from the relatively milder attack of fever generally induced by artificial inoculation. The blood supply animal should be selected from native stock of about two years old, which has been exposed to tick bite from birth. It has been demonstrated that more uniform and satisfactory results are got by direct artificial inoculation than by allowing a limited number of virulent young ticks to do the work. But when this latter course is adopted, rather than allow a well-bred calf to run on a tick-infested pasture like native cattle, it is safer to keep it in tick-free quarters, and begin by placing on it six young ticks, to be increased in two weeks by six more; and so on till a mild attack of the fever has been induced. "If ticks do not get on a calf when it is very young, the older the animal grows the more severe will be the fever, and the greater the danger of death when ticks do get upon it."—Mayo.

After inoculation the animals should be amply provided with succulent green food to keep the bowels open, and should have salt to lick and clean drinking water within reach all the time. Following the preliminary mild attack of fever, which usually begins about a week after inoculation—although it may occur within five days—and lasts for about ten days, a second rise of temperature may occur between the twenty-fifth and fortieth day after the inoculation. "During the periods of high fever there is a rapid destruction of red blood corpuscles. The normal per cent. of red blood corpuscles is about 45, and this is diminished to 25 or even 20 per cent." If the reaction is very marked, animals are liable to fall away very quickly in condition; and they do not

resume their normal growth or increase rapidly in flesh for four or five months, but after this period there is no noticeable effect." In the following summer inoculated cattle require careful handling and good food, and they should not be permitted to become grossly infested with ticks.

"The micro-parasite of tick fever varies in virulency, and cattle vary in their degree of susceptibility or resistance. Moreover, the resistance or susceptibility of the individual animal varies with the condition of the animal, its age, and its vitality or vigour. A very fat or a very poor animal possesses low resistance; an old animal is less able to throw off the waste products and repair the loss of blood cells than a young one; an animal weak from any cause is also less resistant. Besides, there are individual animals that have a low index of resistance, from some condition of the blood or from some unknown cause. And there are other times when the micro-parasite acquires an increasing virulence. The passing of the parasite through non-immunes, or the frequent and rapid transmission of it through cattle, is said to increase its virulence. This in part accounts for the greater virulence of the parasites and the greater number of deaths in native cattle in the fall. The micro-parasite has passed through two or more generations of ticks, and through the body of one or more animals, without having low temperatures to reduce or to retard its activity."—Cary. It has also been found that "when recently immunised cattle are placed upon a ticky pasture alone, they seem to suffer more severely from tick inoculation than when allowed to run with native animals."—Dalrymple.*

The medical treatment of tick fever involves good nursing; a change to clean pasture; the removal of the ticks. When necessary to sustain strength, a litre of new milk with two fresh eggs beaten up in it every four hours. In cases of great prostration, doses of 10 oz. of brandy, and also oil; Epsom salts to remove constipation when it occurs. To a bullock of 600 or 700 lb. live weight, 30 to 60 grain doses of quinine four times a day may be given for two or three days. Very high temperatures should be relieved by spraying with cold water. Cool fresh water and soft green or some other nourishing cooling food should be within the animal's reach.

Apart from all this, the proper course to follow from the national point of view is to get rid of the ticks altogether. The history of the efforts made in this direction and the full measure of the success attained is concisely recorded in the "Report of the Secretary of Agriculture" (the Hon. James Wilson) for 1907, issued 30th November, which says:—"The progress made in the eradication of the cattle tick which transmits Texas fever demonstrates that the ultimate extermination of this costly pest is entirely practicable if Congress and the State Legislatures will provide the necessary means. The great benefit which will accrue to the cattle industry of the south, and incidentally to the country at large, from the success of this work will abundantly justify the necessary expense. The work of tick eradication was not actually begun until 1st July, 1906; yet, as a result of work done to 31st October, 1907, there have been, or will in the near future be, released from quarantine certain areas in Virginia, North Carolina, Georgia, Tennessee, Arkansas, Oklahoma, Texas, and California, amounting to approximately 60,000 square miles; and good headway has been made in still other areas. The work has been pursued in co-operation with State authorities in the States above named and in South Carolina, Alabama, and Louisiana. Complete returns to 31st October last show that during the first ten months of the present calendar year this work has included 2,307,934 inspections and 775,795 disinfections of cattle. Various approved methods for the eradication of ticks have been used, including

* See "Texas Fever: being a General Summary of our Knowledge of the subject to date (October, 1905)" by W. H. Dalrymple, M.R.C.V.S., Agric. Experiment Station of the Louisiana State University, &c.

pasture rotation and dipping, spraying, and hand-dressing with oil and oil-emulsion."

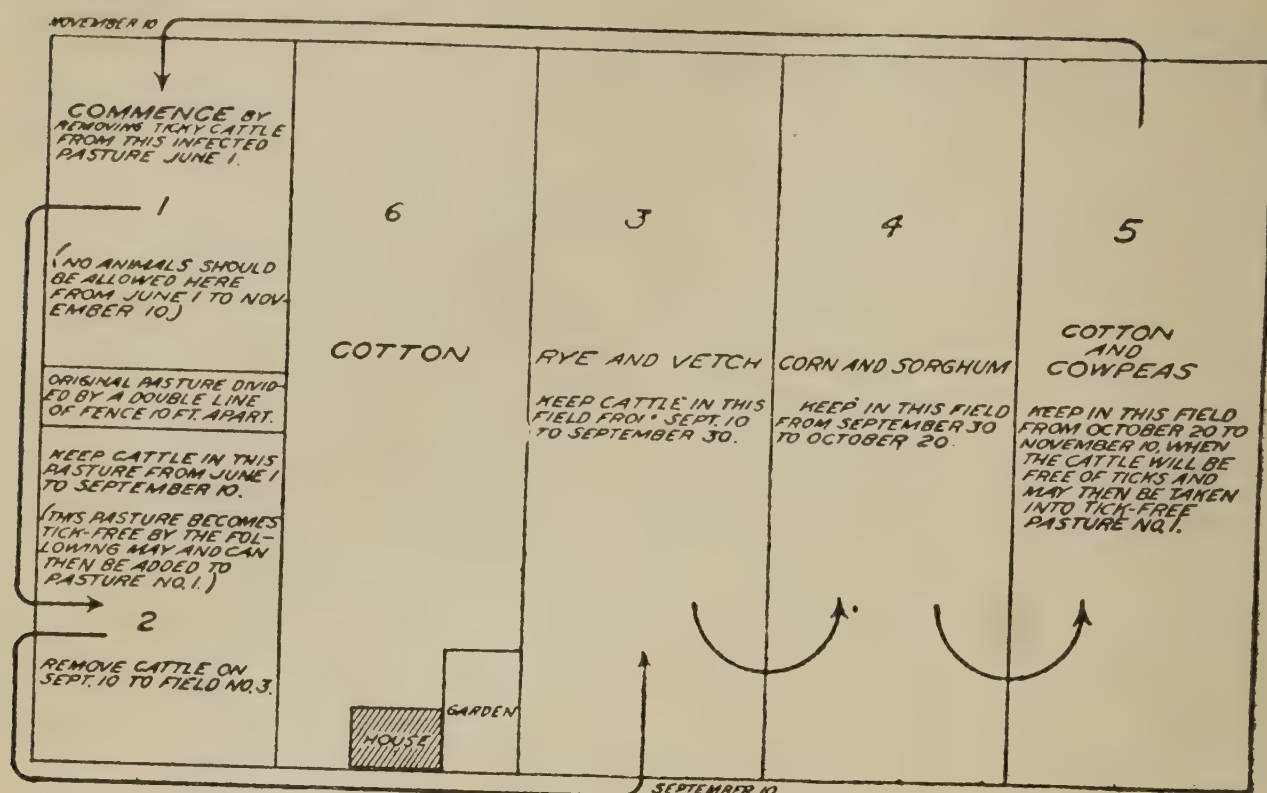


DIAGRAM NO. IV.—CLEANING CATTLE AND SOIL OF TICKS BY PASTURE ROTATION.
From "Louis A. Klein's Report on Methods, 1907."

It has long been a practice in different parts of the world where climatic conditions permitted—notably in South Africa, in Australia, and Cuba—to annually burn off the withered grass, and thus to destroy a large number of ticks and their eggs; but the custom is most injurious to the quality of the herbage, and consequently to the stock-carrying capacity of the pasture.

Several successful methods of clearing the land of ticks, and thereby getting rid of the sole cause of the fever, have been devised since the life history of the tick was fully investigated. Different circumstances require the adoption of different methods. Cattle in large numbers have been dipped in a swim bath or tank with many different solutions, but for years with very indifferent success. As the dipping stuff floats on the top of water filling the tank to within 6 to 10 inches of the surface, it was found impossible to get all parts of the skin properly in contact with the effective material; and, moreover, many cattle died. Even when the tank was filled with dip material, to overcome, at increased cost, the difficulty mentioned, cattle were liable to be drowned.

Messrs. William Cooper and Nephews have (February, 1908) favoured us with the subjoined statement of the case for dipping, more especially in regard to their researches in South Africa.

"The plan adopted was as follows:—Having recognised that the starvation of the ticks was impossible, the only way to attack them was while they were on the animals. As the bont tick had three hosts, and the longest period that it is on an ox is probably not more than fourteen or fifteen days, it was decided that all the animals must be dipped every fourteen days in an arsenical dip. The blue tick, which is on a minimum of six weeks, was readily attacked, but the bont tick has proved more obstinate, not only because some may escape dipping, but because it is more difficult to kill. In order to collect the ticks as rapidly as possible, the farm was heavily stocked with oxen for fattening. These were allowed to roam about the veld, and picked up the ticks, and then the cattle were dipped before the ticks had time to develop or breed. It was hoped that by this method the farm would have been quite cleared of ticks in two or three years. This has not quite succeeded, but the

number of ticks now is very small, and it is hoped that in another year the farm will be quite clean.

"With regard to the effect of this continual dipping, it has been found that young animals suffer less than old oxen, but that the continual dipping has a tendency to delay their fattening and to make the animals 'soft.' If care be taken that the animals are never dipped when they are hot, and are never driven after the dipping until they are quite dry, most of the bad effects can be avoided. Probably the farm would have been clean much earlier if a perfect cattle dip had been in existence. Every cattle dip on the market or that has been recommended was tried, but none of them could be relied upon to kill more than 50 per cent. of the female bont ticks. A cattle dip has, however, been discovered which kills 100 per cent. of the ticks without injury to the cattle, and with this dip further experiments will be carried on. This dip will shortly be placed upon the market under the name of 'Tixol.' While studying the practical questions of the problem, the scientific have not been neglected, and a large amount of work has been carried out upon the anatomy and life history of the ticks in the Cooper Research Laboratories at Watford and Berkhamsted, upon material supplied from Gonubie Park and the other estates belonging to the firm in the Transvaal and Rhodesia."

The problem of applying a wash of safe strength effectively to all parts of the skin of a tick-infested animal appears to have been solved in January, 1905, by the exhibition at Denver stockyards of a spraying machine, invented by Dr. Gorham T. Seabury, State Veterinary for Wyoming. Details may be had from the Seabury Live Stock Spraying Machine and Manufacturing Company, 514 Equitable Buildings, Denver, Colorado, U.S.A.

The machine is a tube placed at the outlet of an ordinary branding chute, wide enough to let cattle or horses pass through it. Forty openings in various parts of the tube permit of forty jets, forming sheets or fans of spraying solution, being forced at every possible angle under a pressure of 30 or 40 lb., so that the liquid gets under the hair and effectively soaks all parts of the body and kills all surface parasites. The most simple and effective dressing employed at first was crude petroleum oil from certain wells in Texas, and known as Beaumont crude oil. This contains from 40 to 50 per cent. of oils boiling below 300 degrees C., and from 1 to 1.5 per cent. of sulphur; but Dr. Klein says that "West Virginia black oil," obtained from wells in West Virginia and Kentucky, gives results equally as good as Texas oil. The proportion to use is 1 part of oil to 4 parts of water, kept thoroughly incorporated by a mechanical mixer with which the machine is equipped. An oil preparation called "Tickicide" can be got in barrels at about 3d. per gallon from the Gulf Refining Company, Tarapa, Florida. The number of animals that can be treated depends upon the rate at which they pass through the machine. Wild cattle rush through more quickly than those accustomed to being handled. Over 4,000 have passed through in seven hours. The use of a satisfactory emulsion of crude oil is advocated by Circular No. 89 of the Bureau of Animal Industry, by Dr. T. M. Price, of the Biochemic Division.

To make an emulsion that will only separate after standing for some considerable time and have a creamy layer that will easily mix again by energetic agitation, 2 gallons of crude petroleum is mixed with $\frac{1}{2}$ -gallon of soft water that has been boiled with $\frac{1}{2}$ -lb. of laundry or hard soap. The emulsion mixed by passing through the spray pump is subsequently diluted, just before using, with $7\frac{1}{2}$ gallons of water. After spraying with crude petroleum, cattle have been known to remain on tick-infested ground for twenty-one days without becoming reinfested.

A good substitute, when these oils are not available, is 1 lb. of flowers of sulphur melted in a gallon of crude cotton-seed oil, and mixed with $\frac{1}{2}$ -gallon of kerosene. While sulphur is a useful ingredient in a dressing for the skin, it is of no value given internally as a means for tick prevention.

As oil is liable to close the pores of the skin, the animals, especially if weak or newly imported, suffer from the heat in very warm weather, and require to be provided with shade. But it should be remembered that:—"Shade and a little moisture in hot weather favours the hatching of eggs and the longevity of the seed tick. Dry and hot sunny places are hard on ticks—in fact, seed ticks cannot live one month in such places." Ticks do not die in great numbers even after effective dipping before the third day, although their development is stopped. They are usually all dead by the sixth day.

Apart from the loss due to fever, the loss of condition in wild cattle, and the diminution in the flow of milk from the irritation caused by the puncturing of the skin, and especially from the loss of blood, when ticks are numerous, would be a sufficient reason for stamping out the pest. "The excessive tax," says Morgan, "of gross infestation of ticks is not only shown by the great loss of flesh of animals attacked, but in the slower development of ticks on animals intensely infested." The poorest and most unthrifty cattle in a herd usually carry most ticks. A few cattle "seem to possess a natural immunity to ticks," and remain almost if not quite free, while their neighbours in the herd are badly attacked. In Cuba, cattle with Zebu blood "appear to have fewer ticks



DIAGRAM V.—GREAT CATTLE TICK (*AMBLYOMMA HEBRÆUM*).

Male, life size, and magnified; outline figure showing size of inflated female.—From the Author's "Farming Industries of Cape Colony."

than common cattle." There the life cycle of "the tick, under normal conditions, is about two and a-half months, or five generations in one year."

The following conclusions by Dr. Louis A. Klein, of South Carolina, based on the life history of the tick, are published 20th May, 1907, in Circular No. 110 of the Bureau of Animal Industry:—

(1.) "If cattle, horses, or mules are placed in a tick-infested pasture, the seed ticks will attach themselves to these animals and grow. [This is so, though horses, asses, and their crosses do not contract Texas fever.]

(2.) "If cattle, horses, and mules are kept out of a tick-infested pasture, the seed ticks will perish of starvation within three or four months after they are hatched. They will not attach themselves to other animals; the ticks usually found on dogs, rabbits, &c., are not cattle ticks, but belong to other species."

(3.) "The time required for the female ticks to deposit eggs and for the eggs to hatch is rarely less than three weeks, and may extend over six or eight weeks, and eggs deposited late in the fall may not hatch until the following spring."

(4.) "In the warmer seasons of the year, twenty to forty days after becoming attached to cattle, the female ticks become mature, drop to the ground, and deposit eggs."

(5.) "Each female tick destroyed will cut off succeeding generations of millions of seed ticks."

Dr. H. A. Morgan, of Tennessee, says, "in freeing pastures from ticks, it is important to keep cattle, horses, and mules out of them for at least four months in summer and nine in fall, winter, and spring." Dr. Butler has had great success in North Carolina by removing "all cattle, horses, and mules from the pasture on 10th September, and keeping them out until 10th April or 1st May"—a period of the year when farm work is not pressing and pastures are of least value. Cattle can be freed from ticks by keeping them in rotation in three fields free from the pest, for a period of twenty days in each.* Ticks that fall off within that time cannot produce seed ticks quickly enough to reinfest the cattle before these move on to clean ground. If placed on land on which cattle, horses, and mules have been excluded for the necessary period, cattle remain clean. Two wire fences, placed 10 feet apart, are needed to divide infested from free land, and prevent ticks crawling from the one to the other; and drainage should never pass from infested to free land, as seed ticks are difficult to drown, and are easily carried by surface water.

Having begun the destruction of the tick, it is necessary to complete it; for reinfestation after a period of freedom would lead to serious mortality among the cattle.

Small numbers of cattle—household milch cows, for example—can be cleaned by dressing with crude oil rubbed well into the bottom of the hair, and closely examining for ticks every week. A second dressing, probably four weeks after the first, and a third about three weeks later, will generally eradicate them.

Another smear for rubbing on, advocated by the Bureau, is a mixture of 1 gallon of kerosene, 1 gallon of cotton-seed oil, 1 lb. of sulphur, and 2 lb. of pine tar.

The parts most likely to need attention are "the regions between the foreleg and the brisket, the inner side of the flank, the internal surface of the ears, the depression at either side of the root of the tail, and the end of the tail." Two men, working one on each side, can dress five or six cattle an hour, and use about $\frac{3}{4}$ -gallon of oil for each animal.

In Cuba three common wild birds (the "toti," *Scolecophagus atrovirideus*, the "mayito," *Agelaius humeralis*, and the "judio," *Crotophaga ani*), besides common barndoor fowls, destroy many adult female ticks, and flocks of Rhinoceros birds or "rhenoster vogels" (*Buphaga erythrorhyncha*) in South Africa visit antelopes and cattle, and clear them of ticks and other skin parasites.

TICK FEVER.

IS GENERAL IMMUNITY ATTAINABLE?

There is, says the "Rockhampton Bulletin," probably no matter affecting stock-owners, concerning which so many contradictory opinions are advanced, and so much conflicting evidence presented, as the question of the efficacy or otherwise of inoculation for the disease variously known as Texas fever, tick fever, and redwater. It is generally admitted that cattle bred on tick-infested country acquire a high degree of immunity; that they are, in fact, practically safe from the disease so long as they are not brought in contact with fresh ticks, either through being travelled or through the introduction of strange, tick-infested cattle among them. There actual knowledge ends. Move the supposed immune cattle 20 miles from their own pasturage, and heavy loss may result. On the other hand, it is equally possible that they may be travelled 500 miles without showing fever at all. Split the mob at the end of the trip, placing half on one run and half on another—we are speaking, of course, of infested country—and of the section turned out on "A" you may lose 40 per cent., while the mob depastured on "B" shows not a sign of the disease.

* See also Diagram IV.

The annual draft from a certain station in this district was for three successive years removed to another station some 60 miles to the north-east without the loss of a beast from fever. The fourth year's draft went to a station 60 miles south-east, and a heavy mortality ensued. The fifth year the owners reverted to the original station, and there was no loss.

The local inspector of stock (Mr. F. F. H. Shepherd) was asked if he could furnish other instances of the vagaries of tick fever, and mentioned the following:—

"A mob of 1,000 cows brought down from the Gulf to Leura Station were turned out there with absolutely no loss from fever. Another mob of Gulf cattle recently sold in this district developed fever after sale, and the loss was disastrous. A mob of bulls from the Gladstone district, passing through the Rockhampton district some time ago, and asserted to be suffering from redwater before starting, developed fever twice within the Rockhampton district, and a third time near Mackay. And the number of cases could easily be multiplied."

A gentleman who has studied this subject for years thus illustrates his experience:—

"I consider the infested country as a vast chessboard. Move cattle from a black square to a black square, and they will be all right; move them from a black square to a white square, and you will have a loss which will range from 5 to 50 per cent."

Unfortunately, the squares are not defined. There is no possibility of ascertaining beforehand whether the cattle from one tick-infested run will or will not develop fever when placed upon another affected area. The above remarks apply whether the so-called immunity of the cattle is due to inoculation performed by the ticks or by man. That immunity is purely local is the verdict alike of the greatest scientific authority of the day and of the intelligent stock-owner.

To this rule of local immunity, a remarkable exception has been observed. Messrs. Archer Brothers, of Gracemere and Torsdale, have, for some years, been in the habit of starting mobs of bulls for sale up the coast as far as Ingham, and down as far as Maryborough, and it has been noted that, not only do these bulls retain their immunity on the road, but that, so far as can be ascertained, none of them have contracted the disease after delivery.

Mr. C. H. Dawson, who represents Messrs. Archer Brothers in such matters, gives details of transactions in recent years. In 1902, he took 100 bulls from Torsdale as far as Kilkivan, selling on the way to about thirty owners. In 1903 and 1904, 100 bulls went to Gayndah. In 1905, the same number went South, and 150 more to Ingham. In 1906, 100 were drafted South. In 1907, 210 went North to Bowen, and 100 to Kilkivan, and in the present year 130 were sent South to Kilkivan. With these cattle—1,090 head in all—there was not a solitary case of redwater on the road, and Mr. Dawson has not heard of any of them suffering from the disease since delivery. Again, in January of last year, he left twelve bulls at Boobyjan Station for sale. At that time the station cattle were dying from redwater, but none of the Archer bulls sickened, nor have they since contracted the disease.

Bulls are a class of cattle notoriously susceptible to the fever. In the face of these figures it seems hardly possible to believe that the Gracemere tick does not confer a general immunity. Were this proved to be the case beyond all shadow of doubt, were it possible to affirm positively that an animal, which had reacted properly after inoculation with the Gracemere blood, was absolutely proof against fever in any part of Queensland, cattle-owners throughout the State would be relieved from one of the greatest dangers they have to face. In fact, the "universal virus," for which Professor Koch vainly sought in South Africa, may have been discovered in Queensland.

Mr. R. S. Archer, while perfectly willing to afford information on the subject, and admitting the facts to be as stated above, declines to express any opinion as to the deductions to be drawn therefrom.

Mr. Shepherd says:—"I have observed the immunity from fever enjoyed by cattle bred upon Torsdale and Gracemere, or depastured for a time on these runs, when travelled to other tick-infested areas, and have reported the matter to the Stock Department, suggesting scientific investigation. If it can be proved that the Gracemere blood confers absolute immunity from tick fever throughout the State, or over any considerable portion thereof, an immense benefit will be conferred on the stock-owners. All the evidence I have been able to obtain points to the desired conclusion, but until thoroughly comprehensive tests have been made it is impossible to say more."

Messrs. Archer and their clients are well satisfied with the results obtained—the why and wherefore does not concern them greatly. To Mr. Shepherd belongs the credit of noting the potential value of these results to cattle-owners throughout the State."

This matter is receiving the earnest attention of Mr. S. Dodd, a veterinary expert, whose services have lately been secured by the Department of Agriculture and Stock. This gentleman's qualifications eminently fit him for the task.

REPORT ON THE METHODS ADOPTED FOR THE ERADICATION OF CATTLE TICKS IN THE UNITED STATES OF AMERICA.

By SYDNEY DODD, F.R.C.V.S.,

Principal Veterinary Surgeon and Bacteriologist to the Queens' and Department of Agriculture and Stock.

Having been instructed to proceed to Queensland, *via* the United States, in order to investigate the tick problem in that country, and the method which the authorities have adopted for coping with tick fever, I obtained a letter of introduction from the British Foreign Office to the United States Minister of Agriculture through Sir H. Tozer, Agent-General for Queensland. Mr. Wilson, Minister for Agriculture, was anxious to aid me in my investigations, and gave instructions to all the officials of the Department of Agriculture to furnish me with all the information possible, and I have the greatest pleasure in expressing my appreciation for the assistance and courtesy extended by all of them.

Unfortunately, it being winter when I reached the United States, there was very little actual field work being done by the department. The ticks in the region where operations are being carried out are not active during this time of the year, and, consequently, the work was practically at a standstill. However, I had numerous interviews with the officials at Washington who are responsible for the planning of the campaign, and also with men who have had charge of a good deal of the actual work in the field. My researches also took me down into Carolina and Virginia, where a good deal of work is in progress, and where some of the veterinary inspectors have remained throughout the winter preparing for the next season's operations, and by their courtesy was taken over farms in the various localities, and shown where the work was being carried on. By this means, although the actual field work of tick eradication was in abeyance, yet I was thus not only able to get a practical illustration of what the United States authorities were doing, but also see the conditions under which the tick lived in the States and how the work was being performed. I also interviewed a number of farmers whose premises had been, or still were, infested with ticks, in order to ascertain, as far as possible, the farmer's point of view of the problem of tick eradication, and I must confess that although they were agreed that the veterinary authorities were conducting a praiseworthy campaign, yet they did not appear to take as active an interest in the matter as was warranted by the presence of the pest.

I also had the good fortune to meet with two very intelligent farmers from Texas, where fairly large herds of cattle exist, and where a large number of ranches are tick infested. One gentleman owned about 1,000 head of cattle in

a tick-infested area, but he had recognised the rôle which the tick played in the transmission of Texas fever (or tick fever), and, by fencing his land and not permitting his cattle to stray off it, or new cattle to be introduced without first ascertaining that they were free from ticks, he had kept his herd and land quite tick free, and, consequently, never lost an animal from tick fever. He also got better prices in the market for his cattle than did his neighbours, whose cattle were tick infested, but he acknowledged that the presence of these cattle around his farm were always a source of anxiety to him, especially as a tick-infested bull might break down his fence and get on to his pastures. When asked what was the attitude of the stock-owners generally in his district, he replied that it was one of utter indifference, the owners not caring whether they got rid of the tick or not; in fact, some men would not buy cattle unless they had ticks upon them, thus insuring that they had already gone through an attack of tick fever.

Several visits were paid to the Experimental Farm and Laboratory at Bethesda, Maryland, where a good deal of work has been done in experimenting with dips, &c. Some very useful and interesting experiments are also being carried out with regard to tuberculosis in pigs, and the occurrence of tubercle bacilli in butter. Also, to the Bacteriological Laboratories in Washington, D. C. Here they have been working on the question of obtaining a curative or preventive serum against swine fever. I also interviewed the Chief of the Dairy Division and the Dairy Bacteriologist, for the purpose of ascertaining what they had been doing with regard to fishiness in butter, and was informed that they had been troubled a good deal with this question, especially in the State of Wisconsin, where a laboratory had been established chiefly for the purpose of carrying on research work in the matter; but although they had been at work now for two years they had not arrived at a solution of the problem, although some progress had been made, inasmuch as they had succeeded in excluding quite a number of factors which had hitherto been suspected of playing some part in it. From what I gathered, they consider the process to be more of a chemical nature than a bacterial one.

The large, and almost new, quarantine station at Athenia, New Jersey, was also visited, in order to see the means which the States have of dealing with live stock arriving from foreign countries, and also the live-stock yards at Buffalo, where large numbers of animals are shipped for export. Here, also, some of the large abattoirs and packing-houses were inspected, for the purpose of noting the system of meat inspection. An opportunity was taken to stop at Ottawa, Canada, for the purpose of gaining information concerning the Veterinary Department there. Although only a few years have elapsed since its reorganisation, yet it has, under Dr. Rutherford, the Veterinary Director-General, made great progress. Their new meat-inspection law, which came into force at the end of 1907, is a very good one, and much good should result from its enforcement. They appear to be making good progress in the control of swine fever and glanders. At the experimental station experiments with a herd of tuberculous cattle are being carried out on the subject of the outdoor treatment of tuberculosis in cattle.

Although, judging from what I observed and from information obtained, the United States Department of Agriculture has, on the whole, been successful in its preliminary campaign against the cattle tick. It would be a great mistake to imagine that the problem of dealing with tick fever in Queensland is solved, or that the task is a simple one. On the contrary, it is one beset with many difficulties. As to whether the methods in vogue in the United States have any practical application in Queensland, it is obviously premature to make any statement, but it is intended at the earliest opportunity to carry out a series of experiments on lines which may have to undergo modification in order to meet the various conditions obtaining in this country; but, above all, the sympathy and active co-operation of all cattle-owners themselves is needed, without which all efforts in this direction will be of little avail.

It should be noted that the United States authorities have been working under conditions largely in their favour. The portions of territory upon which the work has been done are those which have been most easily cleaned of infection, and the climate has also been in their favour. They have had for some years a quarantine line, north of which tick-infested cattle are not permitted except under special conditions. Although this special work of the Federal Government only commenced in 1906, yet a number of individual States have been working on the problem of tick eradication for some years, thus rendering the task of the Federal authorities simpler. Railway facilities for transporting cattle are great, so that tick-infested cattle can be kept off the roads, &c. They have a large sum of money voted for the work of tick eradication, and a large staff of veterinary inspectors to supervise it.

The question of transport of young ticks in hay has not concerned them, as none of the counties worked in export hay at all, neither has the question of the carrying of ticks by horses or mules, although Dr. Melvin acknowledged that they will have to face this factor as they work further south.

I propose to give a brief outline of the conditions under which Texas fever or tick fever exists in the United States, and also the methods which the veterinary authorities have adopted for eradicating the tick from the pastures and cattle.

Texas fever or tick fever has existed in the United States of America for a large number of years, and is said to have been probably introduced into that country with cattle imported by the Spaniards during the early colonisation of Mexico and Southern United States. For years it was known that when the southern cattle were moved to northern States numbers of Northern-bred cattle living along the roads and on the pastures traversed by the southern cattle died, whilst the latter remained healthy; also, when northern cattle were taken south they almost invariably were attacked by the same disease. Investigations resulted, in 1885, in locating the infected, and in the establishment, in 1891, of a quarantine line by the United States veterinary authorities. This is considered by them to be the most important steps yet taken toward controlling the great losses occasioned by the disease. In 1889 and 1890 Kilbourne proved that the cattle tick was essential in the transmission of Texas fever. From this time onward, although much work was done in studying the disease and the life history of the tick, yet little was attempted in the eradication of the actual transmitter—namely, the tick—beyond the maintaining of the quarantine line, except in the case of a number of individual States situated in the infected area, who, no doubt, contributed in keeping the tick within bounds. This quarantine boundary stretches irregularly from California on the west coast right across the continent to Virginia on the east coast. South of this line practically the whole of the country is considered infested territory by the authorities. North of the line the country, except in isolated cases, is free from the cattle tick, and, consequently, from Texas fever also. Besides the safeguard afforded by the system of inspection of cattle, and the presence of inspectors all along the quarantine line, it must be held in mind that the country north of the line is naturally protected at a certain time of the year, as, owing to the low temperature during Winter, ticks do not live on cattle, but are killed off. It is usually the eggs which survive till Spring. As the quarantine line is pushed further south, however, owing to the freeing of areas from tick infestation, this protection will be lost, as then the ticks will be able to live and propagate all the year round.

The quarantine line is very strictly guarded, and no movement of cattle across this from south to north is permitted to take place, save for the purpose of immediate slaughter; and, in this case, movement is allowed only by rail or ship, not by road. The cars in which the cattle are transported are marked conspicuously, "Southern Cattle." From the cars, the cattle are put direct into pens labelled "Quarantine Pens, or Yards," at stockyards approved of by

the authorities, and not moved thence except to the slaughter-houses. Railway cars, stockyards, &c., have to be disinfected before they are used again, in order to destroy any ticks which may have hatched from those dropped from the infested cattle. The regulations governing the movement of cattle below the quarantine line are made yearly by the Minister of Agriculture, under the advice of the veterinary authorities, and they define the boundary of infested districts. Below the quarantine line, provisionally quarantined areas exist, from which cattle may be moved to northern districts at certain times of the year, after inspection by a veterinary inspector, and subject to his granting a certificate. It has been estimated that the loss occasioned by tick fever in the United States to the people in the infected districts is not short of £8,000,000 per annum. Occasionally a slight outbreak of tick fever occurs north of the quarantine line, as a result of the inefficient carrying out of the quarantine regulations, such as the disinfection of cars, or by the wilful breaking of the regulations by cattle-dealers, or by accident. The damage, however, is usually slight, and the outbreak does not get beyond control.

In the summer of 1906, the United States Federal authorities seriously took into hand the problem of eradicating the tick, and during the period in which they have been at work—1906-7—they claim to have cleared a large area from ticks, thus throwing the quarantine line further south. During 1907, 300 officers were employed in the work of tick eradication by the Federal Government, one-fourth of whom were qualified veterinarians. The sum of £50,000 (250,000 dollars) was voted by Congress, and spent in this work, besides that spent by the various States concerned, the latter also employing their own men in addition to those mentioned above.

In the report of the Chief of the Bureau of Animal Industry for 1907, he says:—"Still large amounts must be provided if the work is to be prosecuted on a sufficiently large scale to bring success within a reasonable time."

It must be remembered, however, that in some districts that comprise the area cleared by the department the herds of cattle are not many in number, or the herds themselves are small, and also, that although an area may be infested with ticks, yet every individual farm or herd in this area may not necessarily be infested—in fact, quite a number are free.

For example, in Benton County, Arkansas, a State below the quarantine line, 77,474 cattle were inspected in 1906, 75,993 were free and 1,481 tick-infested, thus equalling a little less than 2 per cent. of cattle tick infested in this district.

In Childers County, Texas, also in the quarantined area, 23 premises, covering 54,260 acres, with 7,875 cattle, were inspected, but no ticks were found. In Cottle County, Texas, there are practically no small farms, the county being made up of ten big ranches, of which six are tick free, covering 25,426 acres, with 4,140 cattle; and four are tick infested, comprising 154,600 acres, with 10,700 cattle. These were only slightly infested, whilst some of the pastures of infested ranches were tick free. The total inspections made in Texas in 1906 show 315 premises, with 1,349,564 acres and 101,448 cattle free from ticks; and 220 premises, with 2,582,883 acres and 156,110 cattle tick infested.

The whole of the work undertaken is based upon the knowledge that if southern cattle, even though carrying the causal organisms in their blood, are free from ticks, they may be allowed to mingle with susceptible animals without any danger of the latter contracting tick fever; also, from the study of the life history of the tick, and from the fact that pastures are not permanently infested by the tick, but that the land must continually be reinfested by fresh ticks dropped from cattle or equines, and that cattle ticks cannot mature except upon these animals. The various methods for obtaining these results

are directed towards destroying the ticks on cattle, as well as getting rid of them from pastures.

During the winter in the States, the work of tick eradication at present comes to a standstill for reasons previously given, and the majority of veterinary inspectors employed in this work are transferred to other duties, such as meat inspections, &c. At the same time, however, a plan of campaign is formulated at headquarters—Washington—for the ensuing season. A veterinary surgeon is placed in charge of each district, and under him are placed other veterinary inspectors, who have charge of subdistricts. Then, again, these latter have with them several lay assistants or stock inspectors. These are always men who have a good deal of experience with cattle, and also are able to talk to the farmers on matters pertaining to ticks. In some cases it is necessary to employ stock inspectors who can live in the saddle and wield a lasso like a cowboy. These men work in groups of about twelve, each group having a cook and a camp outfit. They cover their territory systematically, roping and examining cattle wherever found. Before work is commenced, it is necessary for the Federal authorities to ascertain whether the State in which work is to be done has efficient laws for permitting districts or farms to be quarantined. If not, no work is attempted until such laws are passed.

The first and probably the most important stage in the campaign of tick eradication is an educational one. Means are taken to educate the cattle-owners as to the nature of tick fever, the method of its transmission, and how it may be combated. This is accomplished by employing educated stock inspectors, who of necessity are daily in personal touch with the stock-owners, and who must be able to impart the necessary information; also, by the giving of lectures and addresses on the subject wherever possible by the veterinary inspectors to farmers' societies, &c., and by enlisting the active sympathy of every influential farmer in their district; also by articles published in the local Press, and by bulletins distributed freely by the department among cattle-owners.

The authorities realise that the greatest factor in the successful issue of the work of tick eradication is the co-operation of the stock-owner himself, and in the States there is a good deal of opposition, both passive and active, on the part of the farmer. Sometimes this arises through ignorance, but at others it is sheer indifference, the owner not caring whether his cattle are tick infested or not, nor whether he causes his neighbours' cattle to become infested. One probable explanation for this frame of mind is that the infested districts have harboured the tick for so many years that, in some cases, the cattle-owner does not realise the monetary loss he incurs every year, nor the damage done when the disease gets into non-immune districts. In the report previously quoted, Dr. Melvin says:—"While for the most part the State authorities have co-operated, it is unfortunate that in some sections the bureau's work has met with a lack of support, and even with active opposition; this condition probably being due to a failure to realise the benefits to follow from the work. It, therefore, seems best not to resume operations in such localities until public sentiment changes." In some counties within the infested districts bordering on the quarantine line, the local authorities have organised cattle clubs composed of stock-owners, with a view of interesting them in ridding their premises of ticks, and in preventing cattle from tick-infested farms from coming on to their premises; and it is said that this has been attended with good results. These stock-owners are also able to combine and free their districts from ticks. It is then inspected by a veterinary inspector, who may then release the district from quarantine if such action is warranted. A great obstacle to the voluntary clearing of his land from ticks by a farmer is that, although he may be willing to do his part, he objects to freeing his premises whilst his neighbours do nothing to their's.

General Notes.

TO GET RID OF FLEAS.

Dr. L. O. Howard, Chief of the Bureau of Entomology of the United States Department of Agriculture, writes to "Science" of 29th November last:— "Mr. E. M. Ehrhorn, the well-known entomologist, who is Deputy Commissioner of Horticulture in California, gives me the following: Fill a soup plate with soap suds, in the centre place a glass of water with a scum of kerosene on top; place the soup plate on the floor in an infested room, and set fire to the kerosene at night. Fleas in the room will be attracted, and will jump into the soap suds."

A MONSTER RADISH.

There is a variety of radish grown in Japan that makes 20-lb. edible roots. It is called Sacuratina, and can be had of Northern seedsmen. It has a crisp and sweet rather than a peppery taste, and, while the abnormal size mentioned is not likely to be common, yet a 1-lb. or 2-lb. radish would suffice for an ordinary family.

THE USEFUL TOAD.

It is said that every toad in the garden is worth 20 dollars, as it destroys insects it would cost that amount to kill by ordinary methods. Besides, do they not catch flies?

PEPPER POT.

Whole ginger, 2 oz.; pepper corns, 2 oz.; turmeric, 2 oz.; cayenne pepper, 2 oz.; chillies, 2 oz.; mustard, 1 teacup; curry powder, 1 teacup; vinegar, 1 gallon (in lieu of cassareep). Boil together twenty minutes. Put in a stone jar having a cover. Add any odds and ends of cold game, fowls, meat, &c. Vegetables *must* have a jar to themselves, if required. It will be ready for eating in a fortnight, though it requires twenty years or so to attain the true exquisite "goût." Never under any circumstances attempt to clean the jar. To do so is something worse than sacrilege. The sauce may be renewed as it is used up.

Answers to Correspondents.

DISEASE IN FOWLS.

C. C. ATKINSON, Cashmere.—

Mr. Fern, Poultry Expert, says:—"The symptoms you describe do not point to any disease, but simply that the birds are suffering from the effects of lice or mites, and the remedy is the use of any good insect powder dusted well into the feathers. Houses and roosts must be treated liberally with lime-wash to which carbolic acid may be added. Dust-baths of sifted ashes to be provided if the birds have not the advantage of a free range."

MATERIALS FOR A DIP.—PLANET JUNIOR IN THE VINEYARD.— GROWING GRAPE VINES FROM CUTTINGS.

SEDBERGH TOWERS, Charters Towers.—

1. The Department of Agriculture and Stock recommends the following ingredients for a reliable dip mixture:—Arsenic, 8 lb.; caustic soda, 4 lb.; Stockholm tar, 1 gallon; tallow, 8 lb.; water, 400 gallons.

Directions.—(a) Half-fill with water a 5-gallon drum, add 2 lb. caustic soda, and boil; then add slowly 8 lb. arsenic. Add cold water in small quantities, to prevent over-boiling, till the drum is full. (b) Boil 100 gallons of water in a 400-gallon tank; add 2 lb. caustic soda, then 8 lb. tallow, and boil quickly. Add slowly in a thin stream 1 gallon Stockholm tar. When the whole of the tar has been added, boil from thirty to forty minutes; then add the solution prepared in accordance with instructions in (a); gradually fill the tank with water, and keep the mixture boiling until the tank is full.

2. Mr. Quodling, Inspector of Agriculture, to whom your questions on grape cuttings were submitted, says:—The Planet Junior single-horse machine can be used with advantage in the vineyard. The width between the vines is not stated, but for large areas the horse machine is most economical.

3. I would suggest bending down (layering) conveniently situated portions of the vine, to encourage the formation of roots. This should be done at least three months before the dormant season. Subsequently, cuttings may be made in the ordinary way, but with the advantage of having a base with small roots, or calloused over ready to strike. We have, at the suggestion of Mr. Rainford, late Instructor in Viticulture to this Department, buried grape cuttings for several weeks, and they have rooted and thrown out shoots in a very satisfactory manner.

FOOD VALUE OF GRASSES.

J. M. B., "Ageston."—

No analyses have been made of blady grass or of ditch millet. They are both very coarse hard grasses, and can only be of value as fodders in a very young stage of growth. Buffalo grass is a nutritious, valuable fodder, as shown by the complete analysis given by the Agricultural Chemist, Mr. J. C. Brünich, in the annual report of the Department.

PEACH-TREE PARASITE.

INQUIRER, Carrington, Cairns.—

The plant you forwarded is one of the mistletoe family, named botanically *Loranthus longiflorus*. If allowed to spread, it will eventually kill the tree. Your letter of 20th, as it appeared to require a prompt reply, was answered by letter.

The Markets.

PRICES FOR FRUIT—ROMA-STREET MARKETS.

Article.	APRIL.			
	Prices.			
Apples (Eating), Imported, per case	...	...	...	6s. 6d. to 8s. 6d.
Apples, New England, per packer	...	...	...	...
Apples, Cooking, per case	...	...	...	6s. to 8s.
Apricots, Local, per packer	...	...	...	...
Bananas, Fiji, per case	...	...	...	...
Bananas, Fiji, per bunch	...	...	...	...
Bananas, Queensland, Sugar, per dozen	...	...	...	2½d. to 3d.
Bananas, Queensland, Cavendish, per dozen	...	...	...	3d.
Cocoanuts, per dozen	...	...	...	...
Custard Apples, per case	...	...	...	5s. to 6s.
Grapes, per lb.	...	...	...	...
Lemons (Lisbon), per case	...	...	...	3s. to 5s.
Lemon, rough, per case	...	...	...	...
Mandarins, per case	...	...	...	3s. 6d. to 6s. 6d.
Nectarines, per box	...	...	...	...
Oranges (navel), per case	...	...	...	3s. 9d. to 4s. 1d.
Oranges (ordinary), per case	...	...	...	2s. to 3s. 3d.
Passion Fruit (Local), per case	...	...	...	3s. to 3s. 9d.
Papaw Apples, per quarter-case	...	...	...	...
Peaches, per quarter-case	...	...	...	...
Pears, per case	...	...	...	10s. to 12s. 6d.
Persimmons, per case	...	...	...	8s. to 8s. 6d.
Piemelons, per dozen	...	...	...	...
Pineapples (Queensland), Ripley's, per case	...	...	...	4s. to 5s.
Pineapples (Queensland), rough, per dozen	...	...	...	9d. to 1s. 6d.
Pineapples (Queensland), smooth, per dozen	...	...	...	2s. 9d. to 4s.
Plums, per quarter-case	...	...	...	...
Quinces, per gin case	...	...	...	...
Rockmelons, Local, per gin case	...	...	...	...
Rosellas, per sugar bag	...	...	...	...
Tomatoes, per quarter-case	...	...	...	1s. 6d. to 2s. 3d.
Watermelons, Local (large), per dozen	...	...	...	2s. to 4s.

SOUTHERN FRUIT MARKET.

Bananas, Fiji, per case	...	...	...	...	15s. to 15s. 6d.
„ „ per bunch	...	...	...	...	4s. to 10s.
„ Queensland, per bunch	...	...	...	...	2s. to 6s. 6d.
„ „ per case	...	...	...	...	12s. to 12s. 6d.
Cocoanuts, per bag	...	...	...	...	...
„ per dozen	...	...	...	...	...
Mandarins (Queensland), Emperor, choice, per case	...	...	...	...	7s. to 8s.
Oranges, per case	...	...	...	...	7s. 6d.
Oranges, common, choice, per case	...	...	...	...	...
Oranges, medium, per case	...	...	...	...	...
Passion Fruit, per quarter-case	...	...	...	...	6s. 6d.
Peaches, Victorian, per box of 7½ dozen	...	...	...	...	...
Peanuts, per lb.	...	...	...	...	...
Pears, per bushel case	...	...	...	...	...
Pineapples, Queensland (Queen), per case	...	...	...	...	7s. to 8s.
Pineapples, Queensland (rough), choice, per case	...	...	...	...	7s. to 9s.
Pineapples, Queensland, medium, per case	...	...	...	...	6s. to 7s.
Persimmons, per case	...	...	...	...	7s.
Pomegranates, per case	...	...	...	...	...
Rockmelons, per gin case	...	...	...	...	...
Tomatoes, per box	...	...	...	...	...

The wharf labourers' strike has, it is stated, disorganised the interstate fruit trade.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR
MAY.

							MAY.
Article.							Prices.
Bacon,	Pineapple	...	...	...	...	lb.	8d. to 9½d.
Bran	...	...	...	...	...	ton	£8 5s.
Butter,	Factory	...	...	...	...	lb.	1s. 1d.
Chaff,	Mixed	...	...	...	...	ton	£3 to £5 10s.
Chaff,	Oaten	...	...	...	...	"	£6 to £7
Chaff,	Lucerne	...	...	...	...	"	£4 15s. to £5 5s.
Chaff,	Wheaten	...	...	...	...	"	£3 5s. to £3 10s.
Cheese	...	...	...	...	...	lb.	8½d.
Flour	...	...	...	...	...	ton	£10 15s. to £11
Hay,	Oaten	...	...	...	...	"	£7 15s. to £8
Hay,	Lucerne	...	...	...	...	"	£2 10s. to £4 10s.
Honey	...	...	...	...	...	lb.	3d. to 3¼d.
Maize	...	...	...	...	...	bush.	4s. 4d. to 4s. 8d.
Oats	...	...	...	...	...	"	3s. 6d. to 4s.
Pollard	...	...	...	...	...	ton	£8 5s.
Potatoes	...	...	...	...	...	"	£4 to £9
Potatoes,	Sweet	...	...	...	...	"	...
Pumpkins	...	...	...	...	...	"	...
Wheat,	Milling	...	...	...	...	bush.	5s.
Wheat,	Chick	...	...	...	...	"	4s. 9d. to 5s.
Onions	...	...	...	...	...	ton	£7 10s. to £8
Hams	...	...	...	...	...	lb.	11d. to 1s.
Eggs	...	...	...	...	...	doz.	1s. 0½d. to 1s. 7d.
Fowls	...	...	...	...	...	pair	2s. 6d. to 3s. 6d.
Geese	...	...	...	...	...	"	...
Ducks,	English	...	...	...	...	"	3s.
Ducks,	Muscovy	...	...	...	...	"	3s. 9d. to 4s.
Turkeys	(Hens)	...	...	...	...	"	...
Turkeys	(Gobblers)	...	...	...	...	"	...

ENOGGERA SALEYARDS.

	Animal.	APRIL.
		Prices.
Bullocks		£8 to £9 5s.
Cows		£6 10s. to £7 17s. 6d.
Merino Wethers		18s. 6d.
C.B. „		21s. 6d.
Merino Ewes		15s. 9d.
C.B. „		21s.
Lambs		16s. 9d.
Pigs (Baconers)		...
„ (Porkers)		...

Farm and Garden Notes for July.

FIELD.—The month of July is generally considered the best time to sow lucerne, for the reason that the growth of weeds is practically checked, and the young lucerne plants will, therefore, not be choked by them, as would be the case if planted later on in the spring. If the ground has been properly prepared by deep ploughing, cross-ploughing, and harrowing, and an occasional shower occurs to assist germination and growth, the lucerne will thrive so well that by the time the weeds once more appear it will be able well to hold its own against them. From 10 to 12 lb. of seed will be sufficient for an acre. This is also the time to prepare the land for most field crops, such as potatoes, maize, oats and barley, rye, vetches tobacco, cotton, sugar-cane, field carrots, mangolds, swedes, canaigre, &c. Early potatoes, sugar-cane, and maize may be planted in very early districts, but it is risky to plant potatoes in this month in any districts liable to late frosts, and in low-lying ground it is better to wait till the following month. The greatest loss in potatoes and sugar-cane has been experienced in September, when heavy frosts occurred in low-lying districts in the Southern portion of the State. During suitable weather, rice may be sown in the North. The coffee crop should now be harvested, and yams and turmeric unearthed.

KITCHEN GARDEN.—Should showery weather be frequent during July, do not attempt to sow seeds on heavy land, as the latter will be liable to clog, and hence be injurious to the young plants as they come up. The soil should not be reworked until fine weather has lasted sufficiently long to make it friable. Never walk over the land during wet weather with a view to sowing. The soil cakes and hardens, and good results cannot then be expected. This want of judgment is the usual cause of hard things being said about the seedsman. In fine weather, get the ground ploughed or dug, and let it lie in the rough till required. If harrowed and pulverised before that time, the growth of weeds will be encouraged, and the soil is deprived of the sweetening influences of the sun, rain, air, and frost. Where the ground has been properly prepared, make full sowings of cabbage, carrot, broad beans, lettuce, parsnips, beans, radishes, leeks, spring onions, beetroot, eschalots, mustard and cress, &c. As westerly winds may be expected, plenty of hoeing and watering will be required to ensure good crops. Pinch the tops of broad beans which are in flower, and stake up peas which require support. Plant out rhubarb, asparagus, and artichokes. In warm districts, it will be quite safe to sow cucumbers, marrows, squashes, and melons during the last week of the month. In colder localities, it is better to wait till the middle or end of August. Get the ground ready for sowing French beans and other spring crops.

FLOWER GARDEN.—Winter work ought to be in an advanced state. The roses will now want looking after. They should already have been pruned, and now any shoots which have a tendency to grow in wrong directions should be rubbed off. Overhaul the ferneries, and top-dress with a mixture of sandy loam and leaf mould, staking up grown plants and thinning out others. Treat all classes of plants in the same manner as the roses where undesirable shoots appear. All such work as trimming lawns, digging beds, pruning, and planting should now be got well in hand. Plant out antirrhinums, pansies, hollyhocks, verbenas, petunias, &c., which were lately sown. Sow zinnias, amaranthus, balsam, chrysanthemum tricolour, marigold, cosmos, coxcombs, phloxes, sweet peas, lupins, &c. Plant gladiolus, tuberose, amaryllis, pancratium, ismene, crinums, belladonna, lily, and other bulbs. Put away dahlia roots in some warm, moist spot, where they will start gently and be ready for planting out in August and September.

Orchard Notes for July.

By ALBERT H. BENSON, M.R.A.C.

THE SOUTHERN COAST DISTRICTS.

The Notes for the month of June apply to July as well. The fruit crop of strawberries will be ripening during the month, though extra early fruit is often obtained in June, and sometimes as early as May, under especially favourable conditions. Look out for leaf blight and spray for same with Bordeaux mixture, also watch for the first signs of the grey moth that attacks the fruit, and spray with the sulphide of soda wash. The larvæ of the cockchafer that eats the roots of strawberries should be looked for and destroyed wherever found. Pruning of citrus and other fruit trees may be continued; also the spraying with lime and sulphur. Where the ringing borer, that either attacks the main trunk or the branches at or near where they form the head of the tree, is present, the main stems and trunks should either be painted or sprayed with the lime and sulphur wash during the month, as the mature beetles that lay the eggs that eventually turn to the borers sometimes make their appearance during the month, and unless the trees are protected by the wash they lay their eggs, which hatch out in due course and do a lot of damage. Keep the orchard clean, so that when the spring growth takes place the trees may be in good condition. There is usually a heavy winter crop of pineapples ripening during this and the following months, particularly of smooth leaves. See that any conspicuous fruits are protected by a whisp of grass, as they are injured not only by frost but by cold westerly winds.

THE TROPICAL COAST DISTRICT.

See the instructions given for the month of June. Keep the orchards clean and well worked. Prune and spray where necessary.

SOUTHERN AND CENTRAL TABLELANDS.

Where pruning of deciduous trees has not been completed, do so this month. It is not advisable to leave this work too late in the season, as the earlier the pruning is done after the sap is down the better the buds develop, both fruit buds and wood buds; thus securing a good blossoming and a good growth of wood the following spring.

Planting can be continued during the month. If possible, it should be finished this month, for though trees can be set out during August, if a dry spell comes they will suffer, where the earlier planted trees, which have had a longer time to become established, will do all right, provided, of course, that the land has been properly prepared prior to planting, and that it is kept in good order by systematic cultivation subsequent to planting.

Don't neglect to cut back hard when planting, as the failure to do so will result in a weakly growth. As soon as the pruning is completed the orchards should get their winter spraying with the sulphur-lime wash, and either with or without salt as may be wished. See that this spraying is thoroughly carried out, and that every part of the tree is reached, as it is the main treatment during the year for San José and other scale insects, as well as being the best time to spray for all kinds of cankers, bark rot, moss, lichens, &c.

When the orchard has not been ploughed, get this done as soon as the pruning and spraying is through, so as to have the land in good order for the spring cultivations. See that the work is well done, and remember that the

best way to provide against dry spells is to keep moisture in the soil once you have got it there, and this can only be done by thorough and deep working of the soil.

When obtaining trees for planting, see that they are on good roots, and that they are free from all pests, as it is easier to prevent the introduction of pests of all sorts than to eradicate them once they have become established. Only select those varieties that are of proved merit in your district; don't plant every kind of tree that you see listed in a nurseryman's catalogue, as many of them are unsuited to our climate. The pruning of grape vines may be carried out in all parts of the tablelands other than the Stanthorpe district, where it is advisable to leave this work as long as possible, owing to the danger of spring frosts.

Where grape vines have been well started and properly pruned from year to year, this work is simple; but, where the vines have become covered with long straggling spurs, and are generally very unsightly, the best plan is to cut them hard back, so as to cause them to throw out good strong shoots near the main stem. These shoots can be laid down in the place of the old wood in following seasons, and the whole bearing portion of the vine will be thus renewed.

Where vineyards have been pruned, the prunings should be gathered and burnt, and the land should receive a good ploughing.

LIST OF AGRICULTURAL, HORTICULTURAL, AND PASTORAL SOCIETIES AND ASSOCIATIONS IN QUEENSLAND.

Postal Address.	Name of Society.	Name of Secretary.	Show Dates.	
			1907.	1908.
Allora ...	Central Downs Agricultural and Horticultural Association	J. H. Buxton ...	7 Feb.	
Allora ...	The Allora Farmers' Progress Association	P. Donovan ...		
Amby ...	Amby Farmers' Association ...	W. Jas. Sullivan ...		
Atherton ...	Barron Valley Agricultural, Pastoral, and Industrial Association	G. Bardon ...	24 and 25 July	
Atherton ...	The Atherton District Farmers' Association	Fredk. Stewart ...		
Ayr ...	Lower Burdekin Farmers' Association	G. S. Mackersie ...		
Ayr ...	Lower Burdekin Pastoral, Agricultural, and Industrial Association	I. A. Holmes ...		
Beaudesert ...	Logan and Albert Pastoral and Agricultural Society	A. Winship ...	1 May	
Beenleigh ...	Agricultural and Pastoral Society of Southern Queensland	Wilson Holliday ...	20 Sept.	
Beenleigh ...	Logan Farming and Industrial Association	Wm. G. Winnett, Loganlea		
Biggenden ...	Biggenden Agricultural and Pastoral Society	C. J. Stephensen ...	24 and 25 July	9 and 10 July
Blackall ...	Barcoo Pastoral Society ...	...	28 and 29 May	
Blackbutt ...	Farmers' Progress Association ...	John Dreghorn ...		
Boonah ...	Fassifern and Dugandan Agricultural and Pastoral Association	C. E. Mackenzie ...	27 and 28 June	13 and 14 May
Booyal ...	Booyal Farmers' Progress Association	N. Rosenlund ...		
Bowen ...	Pastoral, Agricultural, and Mining Association	Geo. Turner ...		
Bowen ...	Proserpine Farmers and Settlers' Association	J. Cooper ...		
Bowen(Proserpine) ...	Cannon Valley Farmers and Settlers' Association	J. H. Ryan ...		
Bowen ...	Bowen Farmers and Fruitgrowers' Association	H. C. Smethurst ...		
Brisbane ...	Horticultural Society of Queensland	F. W. Woodruffe ...		
Brisbane ...	Queensland Acclimatisation Society	E. Grimley ...		
Brisbane ...	National Agricultural and Industrial Association of Queensland	Charles A. Arvier	13, 14, 15, 16, and 17 Aug.	10, 11, 12, 13, 14, & 15 Aug.
Brisbane ...	United Pastoralists' Association ...	Fredk. Ranson ...		
Brisbane ...	Queensland Beekeepers' Association	F. Wilsdon Smith		
Brisbane ...	Queensland Chamber of Agriculture	F. W. Peek ...		
Brisbane ...	Queensland Citrus-growers' Association	R. M. Cooper ...		
Brisbane ...	Combined Moreton Association ...	Wm. Ewart ...		
Brookfield ...	The Brookfield and Pullen Vale Farmers, Dairymen, and Fruitgrowers' Association	W. R. Moon ...		
Buderim ...	Buderim Mountain Coffee and Fruit-growers' Association	G. O. Burnett ...		
Buderim Mt. ...	North Coast Central Association ...	James Lindsay ...		
Bundaberg ...	Bundaberg Horticultural and Industrial Society	H. E. Ashley ...		
Bundaberg ...	Council of Agriculture ...	H. J. Page ...		
Bundaberg ...	Bundaberg Agricultural, Pastoral, and Industrial Society	H. J. Page ...	29 and 30 May	
Bundaberg ...	Woongarra Canegrowers and Farmers' Association	Thos. W. Walker		
Burpengary...	Burpengary Farmers' Association ...	F. W. Uhlmann ...		
Cairns ...	Aloombah Farmers' Association ...	N. P. Petersen ...		
Cairns ...	Cairns Agricultural, Pastoral, and Mining Association	J. Reid ...	5 and 6 Sept.	
Cairns ...	Cairns District Coffee-growers' Association	L. Battinson ...		
Cairns ...	Cairns District United Farmers' Association	Wm. Griffin ...		
Cairns ...	Hambleton Planters' Association ...	A. W. Hawkins ...		
Cardwell ...	Rockingham Progress Association ...	T. E. Fitzsimmons		

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Show Dates.	
			1907.	1908.
Cawdor ...	Highfields and Cawdor Farmers' Association	H. Franken ...		
Charleville ...	Central Warrego Pastoral and Agricultural Association	G. M. Bell ...	14 and 15 May	
Charters Towers	Towers Pastoral, Agricultural, and Mining Association	A. H. Pritchard ...	18 and 19 June	
Childers ...	Isis Agricultural Association ...	H. Epps ...		
Childers ...	Doolbi Mill Branch, Isis Agricultural Association	R. S. Rankin ...		
Childers ...	Childers Mill Branch, Isis Agricultural Association	H. Epps ...		
Childers ...	Childers Pastoral, Agricultural, and Industrial Society	A. Eastaughffe ...	12, 13, and 14 June	
Childers ...	The Childers Mill Canegrowers' Association	A. Eastaughffe ...		
Clermont ...	Peak Downs Pastoral, Horticultural, and Agricultural Society	F. Leysley ..		
Cleveland ...	Cleveland Horticultural Society ...	Miles R. Fox ...	31 Aug.	
Clifton ...	Darling Downs Pastoral, Agricultural, and Industrial Association	S. J. B. Just ...		
Columboola ...	The Columboola Farmers and Settlers' Association	Geo. T. Sutton ...		
Coochin ...	The Coochin Farmers' Progress Association	J. T. W. McLaughlin		
Cooyar ...	Yeraman Creek Farmers' Progress Association	M. Harland ...		
Cooran ...	Cooran Progress and Agricultural Association	A. G. Bosanquet ...		
Crow's Nest	The Crow's Nest Agricultural and Horticultural Society	James Gleeson ...		
Croydon ...	The Gulf Mining, Pastoral, and Industrial Association	V. Creagh ...		
Cunnamulla	South Warrego Pastoral Association	J. Winward ...		
Dalby ...	Northern Downs Pastoral and Agricultural Association	E. Watt ...		
Dallarnil Scrub, <i>via</i> Degilbo	Dallarnil Farmers and Dairymen's Progress Association	Vincent H. Jones		
Dallarnil ...	The Dallarnil and Woowoonga Sugar-growers' Association	John C. Robertson		
Dundowran, <i>via</i> Maryborough	Dundowran and Takura Settlers' Association	H. J. E. Tooth ...		
Esk ...	Esk Agricultural, Pastoral, and Industrial Society	J. G. Smith ...	30 April	26 May
Eudlo ...	Eudlo Farmers and Fruitgrowers' Progress Association	Walter T. Jeremy		
Flagstone Ck., <i>via</i> Helidon	Flagstone Creek Farmers' Progress Association	James Scanlan ...		
Forest Hill ...	Forest Hill Agricultural and Progress Association	Wm. Jones ...		
Gayndah ...	Gayndah Pastoral, Industrial, Agricultural, and Horticultural Association	Thomas McMahon	25 and 26 June	
Gayndah ...	Reid's Creek Farmers' Progress Association	James W. Small ...		
Geraldton ...	Johnstone River Sugar-growers and Manufacturers' Association	W. Stevenson ...		
Gin Gin ...	Currajong and Gin Gin Agricultural and Pastoral Society	J. R. Hamilton ...	15 June	
Gladstone ...	Gladstone Pastoral and Agricultural Association	W. J. Manning ...		
Gladstone ...	Port Curtis Agricultural, Pastoral, and Mining Association	J. T. W. Brown ...		
Gooburrum, Bundaberg	Gooburrum Farmers and Cane-growers' Association	W. J. Tutin ...		
Goombungee	Goombungee Farmers' Association ...	Thos. Smith ...	23 Jan.	
Goondiwindi	MacIntyre River Pastoral and Agricultural Society	E. T. Drake ...	3 and 4 April	
Gracemere ...	The Gracemere District Farmers and Progress Association	Arthur E. Fisher ...		
Gympie ...	Agricultural, Mining, and Pastoral Society	F. Vaughan ...	21 and 22 Aug.	

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Show Dates.	
			1907.	1908.
Gympie ...	Chatsworth Farmers' Progress Association	W. Allen		
Gympie ...	Gympie Horticultural Society ...	Charles Brasch ...		
Gympie ...	Woondum and Brisbane Road Farmers' Progress Association	J. Mullaly ...		
Harrisville ...	Harrisville Farmers' Progress Association	W. J. Burnett ...		
Hatton Vale	Hatton Vale Farmers' Progress Association	P. Sharry, junr. ...		
Headington Hill	Queensland Farmers' Association ...	J. E. Stehn ...		
Helidon ...	Helidon Scrub Farmers' Progress Association	James Sweeney ...		
Helidon ...	Monkey Creek Farmers' Progress Association, Withcott, Helidon	Thomas Turner ...		
Hendra ...	Nundah Agricultural, Horticultural, and Industrial Association	Geo. A. Patullo ...		
Herbert River	Halifax Planters' Club ...	A. Campbell ...		
Herbert River	Macknade Farmers' Association ...	Edwin S. Waller ...		
Herbert River	Fairford Farmers' Association ...	D. G. Scott ...		
Herbert River	United Farmers' Association ...	D. G. Scott ...		
Herberton ...	Mining, Pastoral, and Agricultural Association	John M. Hollway	1 April	
Hodgson ...	Hodgson and Dargal Farmers' Association	I. Stevenson ...		
Hopetoun ...	Hopetoun Pastoral, Agricultural, and Progressive Association	John Walsh ...		
Hughenden...	Hughenden Pastoral and Agricultural Association	H. G. McLean ...		
Ingham ...	Herbert River Pastoral and Agricultural Association (Agricultural Show)	P. J. Cochrane ...		
Ingham ...	Stone River Farmers' Association ...	W. B. G. Johnson		
Ipswich ...	Ipswich and West Moreton Agricultural and Horticultural Society	P. W. Cameron ...	17 Oct.	
Ipswich ...	Queensland Pastoral and Agricultural Society	J. McGill ...	19, 20, and 21 June	
Ipswich ...	The Amberley Farmers' Progress Association	Clark T. Seymour...		
Kelsey Creek via Bowen	Kelsey Creek Farmers' Progress Association	A. Fontaine ...		
Kolan, North	Kolan Canegrowers and Farmers' Association	Jas. H. Hendy ...		
Kilkivan ...	Kilkivan District Farmers and Settlers' Progress Association	M. Bambling ...		
Kingaroy ...	Kingaroy Farmer's Association ...	C. H. Hooper ...		
Kingaroy ...	South Burnett Agricultural, Pastoral, and Industrial Society	...	29 and 30 Aug.	
Laidley ...	Lockyer Agricultural and Industrial Society (at Gatton)	W. A. McIlwraith		
Lakeside ...	Mungore Farmers' Association ...	C. C. Ridley ...		
Longreach ...	Longreach Pastoral and Agricultural Society	J. P. Peterson ...	6 and 7 May	
Lowood ...	The Lowood and Tarampa Pastoral and Agricultural Association	D. E. C. Kroger ...	Sept.	
Ma Ma Creek, via Grantham	Ma Ma Creek Farmers' Progress Association	A. McKenzie ...		
Mackay ...	Agricultural, Pastoral, and Mining Association	F. Black ...		
Mackay ...	Pioneer River Farmers and Graziers' Association	J. P. Moule ...	4 and 5 June	
Mapleton ...	Fruitgrowers and Farmers' Progressive Association	W. J. Smith ...		
Mareeba ...	Mareeba Mining, Pastoral, and Agricultural Association	F. Cruckshank ...	3 and 4 June	
Maryborough	Maryborough Horticultural Society...	H. A. Jone ...		
Maryborough	The Island Farmers' Progress Association	H. Simpson, junr.		
Maryborough	Wide Bay and Burnett Agricultural and Horticultural Society	A. H. Jones ...	22, 23, and 24 May	
Miriam Vale	Miriam Vale Farmers' Association	J. Spencer ...		
Montville ...	Montville Fruitgrowers and Farmers' Progress Association	C. J. Wyer ...		

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Show Dates.	
			1907.	1908.
Mooloolah ..	Mooloolah Farmers and Fruitgrowers' Progress Association	G. S. Skerman ...		
Mosman ...	Mosman District Agricultural Society	G. W. Muntz ...		
Mount Cotton	Mount Cotton and Redland Bay Fruitgrowers and Farmers' Association	W. E. Burns ...		
Mount Mee...	Mount Mee Farmers' Association ...	Jas. H. Robinson ...		
Mount Morgan	Mount Morgan Agricultural, Pastoral, and Poultry Society	J. S. Lyle ...		
Mount Ubi, Eumundi	The Kenilworth Farmers' Association	H. Pickering ...		
Nambour ...	Dulong and Kureelpa Farmers and Canegrowers' Association	A. A. Petrie ...		
Nambour ...	Obi Obi Farmers and Dairymen's Progressive Association	H. Robinson ...		
Nanango ...	Nanango Agricultural, Pastoral, and Mineral Society	J. W. Sigley ...	25 and 26 April	
Nanango ...	North Barker's Creek Farmers' Association	A. Becker ...		
Nerang ...	Southern Queensland and Border Agricultural and Pastoral Association	H. J. Cooper ...	18 Oct.	
North Isis ...	North Isis Canegrowers' Association	T. E. Barnes ...		
Oakey ...	Oakey Agricultural and Pastoral Society	E. R. Pace ...		
Palmwoods ...	Palmwoods Industrial Fruitgrowers' Progress Association	H. Taylor ...		
Peachester, via Beerwah, N.C. Line	The Peachester Progress Association	W. Vieritz ...		
Pittsworth ...	Pittsworth Pastoral, Agricultural, and Horticultural Association	John J. Daniel, senr.	30 Jan.	
Pomona ...	Pomona Agricultural and Progress Association	H. J. Scott ...		
Port Douglas	Port Douglas and Mosman Pastoral, Agricultural, Horticultural, and Mining Association	H. McMahon ...	August (Date not fixed)	
Proserpine ...	Preston Farmers and Settlers' Association	T. Duval ...		
Proserpine ...	Preston Farmers and Canegrowers' Association	R. C. Dagg ...		
Proserpine ...	Cannon Valley and District Farmers' Progress Association	W. A. Compton ...		
Roadvale ...	Roadvale Progress Association ...	Henry Clark ...		
Rockhampton	Alton Downs Farmers' Association...	G. T. Crook ...		
Rockhampton	Central Queensland Farmers and Selectors' Association	T. Whitely, Coowonga		
Rockhampton	Central Queensland Stockowners' Association	R. R. Dawbarn ...		
Rockhampton	Rockhampton Agricultural Society...	A. C. Lyons ...	20, 21, and 22 June	
Roma ...	Western Pastoral and Agricultural Association of Queensland	Angus McPherson	16 and 17 July	
Roma ...	Yingerbay Farmers' Association ...	R. Frederick ...		
Roma (Blythedale)	Warooby Farmers' Association ...	Geo. Munt... ..		
Roma ...	Euthulla Farmers and Fruitgrowers' Association	J. Bates ...		
Roma ...	The United Maranoa Farmers' Association	R. Frederick, senr.		
Rosewood ...	Farmers' Club	P. H. Adams ...	29 and 30 May	
Southport ...	Southport Horticultural Society ...	E. Fass ...		
Springsure ...	Queensland Pastoral Society...	G. R. Milliken ...		
Stanthorpe ...	Border Pastoral, Agricultural, and Mining Society	Geo. Simcocks ...	20 and 21 Feb., 1908	
St. George ...	Balonne Pastoral and Agricultural Society	T. M. Cummings ...	7 and 8 May	
Sydney ...	Royal Agricultural Society of New South Wales	...	7, 8, 9, and 10 Aug.	

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Show Dates.	
			1907.	1908.
Takura (Pialba line)	Takura Farmers' Progress Association	S. E. Tooth ...		
Teutoberg ...	Teutoberg Farmers' Progress Association	E. M. Nothling ...		
Tinana ...	Tinana Fruitgrowers and Farmers' Association	H. G. Habler ...		
Tingoora ...	Tingoora Farmers' Progress Association	Arthur Boisen ...	6, 7, 8, and 9 Aug.	
Toowoomba...	Royal Agricultural Society of Queensland	G. A. Leichney ...		
Townsville ...	Townsville Pastoral, Agricultural, and Industrial Association (formerly North Queensland Pastoral and Agricultural Association)	J. N. Parkes ...	2 and 3 July	
Upper Kedron	Upper Kedron Fruitgrowers and Farmers' Association	A. Marshall ... A. Pickering ...		
Wallumbilla	Wallumbilla Farmers' Association ...	A. Budd ...		
Warren Siding	The Stanwell United District Farmers' Union	G. N. Terry ...		
Warwick ...	Eastern Downs Horticultural and Agricultural Association	F. H. Selke ...	12, 13, and 14 Feb.	
Wellington Point	Wellington Point Agricultural, Horticultural, and Industrial Association	Victor Drury ...	18 Sept.	
West Haldon, <i>vid</i> Greenmount	West Haldon Farmers' Progress Association	A. E. Ayris ...		
Wondai ..	Mondure Farmers' Progress Association	S. R. Monteith ...		
Woolloom-gabba	Queensland Dairy Herdbook Society	Alfred Gorrie ...		
Woombye ...	Maroochy Pastoral, Agricultural, Horticultural, and Industrial Society	P. S. Hungerford...		
Woombye ...	Woombye Fruitgrowers' and Progress Association	E. E. McNall ...		
Wooroolin ...	Wooroolin Farmers' Progress Association	A. Deighton ...		
Wooroolin ...	Wooroolin Farmers' Union ...	H. N. Campbell ...		
Yandina ...	Yandina Agricultural and Progress Association	W. R. Brayden ...		
Yingerbay ...	United Farmers' Association of the Maranoa	R. Frederich ...		
Zillmere ...	Zillmere Horticultural Society ...	E. H. Decker ...		

Societies and associations desirous of being registered and placed on the above list must make application to that effect, and forward to the Under Secretary for Agriculture and Stock the following particulars:—

Number of members who have paid their subscriptions for 1907.

Number of meetings held by the Society during 1907.

Date of the last meeting.

Name of the Secretary for 1908.

Public Announcements.

The EDITOR will be glad to receive any papers of special merit which may be read at meetings of Agricultural and Pastoral Associations in Queensland, reserving, however, the right to decide whether their value and importance will justify their publication.

Secretaries of Associations are requested to be good enough to forward to the EDITOR, as early as possible, the dates of forthcoming Shows, as it is important in the interests of the Associations that these dates should be published.

To enable recipients of the *Queensland Agricultural Journal* to have the half-yearly volume bound, covers in boards and cloth will be supplied from this office on application to the Under Secretary for Agriculture and Stock. Applications must be accompanied by a remittance of SIXPENCE to cover cost. For the convenience of those who are not within reach of a bookbinder, a Special Cover has been designed, which obviates the necessity for binding. These covers will be supplied at ONE SHILLING each.

In order to avoid disappointment, correspondents who wish for replies to questions in the *Journal* are requested to note that it is imperative that all matter for publication on the first day of any month should reach the Editor by the 15th of the previous month.

For the information of those who are desirous of communicating with the managers of State farms, we give their names and addresses below:—Queensland Agricultural College, Gatton, principal, J. Mahon; Westbrook State Farm, Westbrook, manager, C. Ross; Biggenden State Farm, Biggenden, manager, D. Macpherson; Hermitage State Farm, Warwick, manager, John Liverseed; Gindie State Farm, manager, R. Jarrott; Kamerunga State Nursery, Cairns, manager, Howard Newport; Roma State Farm, manager, R. Soutter; Botanic Gardens, director, J. F. Bailey.

It is notified, for the information of intending Visitors to the Queensland Agricultural College, that the Second Wednesday in each month has been set apart for the reception of Parties of Farmers and others desirous of inspecting the Institution. Supplies of hot water and milk can be obtained at the College, if desired.

IMPORTATION OF PLANTS, FRUIT, SEEDS, ETC., INTO CAPE COLONY.

The Department of Agriculture and Stock has received from the Acting Prime Minister of the Commonwealth a copy of a Proclamation issued by the Governor in Council of Cape Colony, embodying revised regulations with regard to the introduction of plants, trees, fruit, seeds, roots, &c., into that colony from overseas, by which such introduction of eucalyptus, acacia, coniferous trees, and certain stone fruits is prohibited. Those interested in the export of such plants may obtain all information on the subject from the Department of Agriculture and Stock, Brisbane.

QUEENSLAND AGRICULTURAL COLLEGE.

FOR SALE.

PURE-BRED PIGS, all from imported stock, including Berkshire and Large and Middle Yorkshires. BOARS, 2 GUINEAS; SOWS, 1 GUINEA each; f.o.b. Gatton.

Poultry of the following breeds:—Brown Leghorns, Silver-grey Dorkings, Old English Spangled Game, Plymouth Rocks, Minorcas, White Wyandottes, Silver-laced Wyandottes, Black Orpingtons, Buff Orpingtons, White Leghorns. Prices, from 10s. each, f.o.b. Gatton.

Eggs of the above breeds are available in the season—1st July to 31st December; and nine out of each setting are guaranteed fertile. Should less than nine prove to be fertile, the infertiles will be replaced if returned carriage paid. This rule will be strictly adhered to. Price, 10s. per setting, for all breeds, f.o.b. Gatton.

Applications for Setting of Eggs, accompanied by Remittance, may be made to the Principal, Queensland Agricultural College.

A few Settings of American Bronze-wing Turkey Eggs will be available at 15s. per setting, f.o.b. Gatton.

As it has been decided that all surplus stock is to be disposed of by auction sales to be held annually, no pure-bred bulls will be available for private sale.

The following Stud Animals are available for Service at the College Farm, at a charge of 10s. for pure-bred and 5s. for grade cows:—Imported Shorthorn, Jersey, Holstein, and Guernsey Bulls.

The following Bulls imported from Great Britain are also available for Service at a charge of 10s. for all cows:—

Ayrshire Bull, SPECULATION.

Shorthorn Bull, BURTON SPOT.

Sows may be served also by imported Berkshire, British Large Black, and Yorkshire Pigs, at a charge of 5s. for each service.

Paspalum Roots will be supplied to purchasers at 2s. 6d. per sack, f.o.b. Gatton. Applicants will be supplied on receipt of remittance to the amount of the order.

Small quantities of Roots of the following Grasses will also be available for disposal:—Rhodes Grass, Wonder Grass.

Seeds for Sale:—Cowpea, Sunflower, Sorghums, Panicum.

JOHN MAHON, Principal.

"THE QUEENSLAND FLORA"

By F. MANSON BAILEY, F.L.S.,

Colonial Botanist of Queensland.

WITH PLATES ILLUSTRATING SOME RARE SPECIES.

IN SIX PARTS, OF BETWEEN 300 AND 400 PAGES EACH, ROYAL OCTAVO.

Price, £1 10s. for Complete Work.

Obtainable at the DEPARTMENT of AGRICULTURE and STOCK.

"QUEENSLAND GOVERNMENT MINING JOURNAL,"

PUBLISHED MONTHLY,

(Under the Authority of the Mines Department),

And contains the most Authentic Information pertaining to Mining Matters
in Queensland.

Publishers: GORDON & GOTCH, Queen street, Brisbane, and 15
St. Bride street, Ludgate Circus, London, E.C.

Copies can likewise be obtained from Booksellers on the Mining Fields of
the State and in the Australasian Capitals. Also, from the

QUEENSLAND GOVERNMENT OFFICE,

Westminster Chambers, Victoria street, London, S.W.

QUEENSLAND AGRICULTURAL COLLEGE.

The College, which is situated within 4 miles of Gatton and 1 mile from the College Railway Siding, comprises 1,692 acres, and the buildings can accommodate 60 Students.

TERMS.

TWENTY-SEVEN POUNDS per annum, paid half-yearly in advance. Students are also charged One Pound per annum each for medical attendance, the sports fund, and for guarantee fee.

The course of instruction includes PRACTICAL AGRICULTURE in all its branches, DAIRYING, GARDENING, STOCK-BREEDING, and MECHANICAL ARTS. Classes are also held daily for THEORETICAL INSTRUCTION in these branches, as well as in SURVEYING, CHEMISTRY, &c.

The College Calendar, giving full particulars, may be obtained on application to the Principal at the College, or to the Under Secretary for Agriculture and Stock, Brisbane.

BURSARIES.

Four bursaries are given annually. An examination for these is held in June or July of each year. Bursaries will be awarded upon the following conditions:—Candidates (males) to be from sixteen to eighteen years of age, of sound constitution, and in good health; they must have resided in the State for the two years immediately preceding the time of their examination for such bursary, or their parents must have resided in the State three years immediately preceding such examination. The bursar is entitled—subject to good behaviour and the pleasure of Parliament—to free board and instruction as a resident student for a period of three years. He is required to take up his residence at the College within one month of the publication of the results of the examination; otherwise he forfeits his right to a bursary.

The AGE of CANDIDATES for Admission to the College as Students is Sixteen Years.

HERMITAGE STATE FARM.

FOR SALE.

PURE-BRED MIDDLE YORKSHIRE BOARS (Progeny of Imported Stock), £2 2s. each on rail at Hermitage.

TURKEY GOBBLERS, 11 months old, THIRTY SHILLINGS each on rail at Hermitage.

FOR SERVICE—

Middle Yorkshire Boar, HOLYWELL CHUB (Imported)

Berkshire Boar, YOUNG BOOMERANG (Imported).

Full particulars on application to THE MANAGER, State Farm, Hermitage.

STATE FARM, WESTBROOK.

CANARY GRASS

(*Phalaris commutata*).

This is the best all-the-year-round grass as yet introduced for Green Cutting, Hay, or Feeding-off. Planting should be done during the Winter and Early Spring, before hot dry weather sets in. It is particularly luxuriant in winter, and behaves remarkably well during the hot dry months. The Manager believes it will flourish in any part of the Commonwealth.

Rootlings: Two SHILLINGS AND SIXPENCE per Dozen, or TWELVE SHILLINGS per 100.

To expedite delivery, application should be made direct to the MANAGER, Westbrook State Farm, together with remittance to cover the cost of Rootlets and Freight.

STATE SCHOOLS will be supplied with Small Parcels of Rootlings of the above FREE OF CHARGE.

Applications, however, must include cost of freight.

POULTRY.

GOLDEN WYANDOTTE COCKERELS, from Heavy Laying Strains, FOR SALE. Price: SEVEN SHILLINGS AND SIXPENCE each. Apply to
THE MANAGER.

PURCHASE OF STOCK AND PRODUCE FROM THE DEPARTMENT OF AGRICULTURE.

Purchasers of Stock and Produce, Plants, Seed, &c., from the State Farms and Agricultural College are reminded that Sales from these Institutions are made for Cash only. Persons desirous of making purchases should, therefore, first ascertain the cost of whatever articles they desire to obtain, and remit the full purchase-money when sending an order.

COTTON SEED.

We have been requested to notify Cotton Planters that Messrs. J. KITCHEN AND SONS, Limited, are prepared to supply UPLAND COTTON SEED FREE for this year's planting, and that the firm will pay the railage on all Cotton consigned to them during this year and 1907. The railage which has been already charged to Cotton Suppliers will be refunded to those who have sent in supplies.

STATE NURSERY, KAMERUNGA, CAIRNS.

RUBBER, COCOA, KOLA-NUT, CAROB BEAN, KAPOCK, VANILLA, CARDAMOM, BREADFRUIT, DIVI-DIVI, GINGER, AND OTHER VALUABLE TROPICAL ECONOMIC PLANTS FOR SALE, AT NOMINAL RATES, TO SETTLERS AND FARMERS.

The Instructor in Tropical Agriculture notifies that PLANTS or SEEDS of the above useful and valuable AUXILIARY PRODUCTS may be obtained by application to the Manager, Kamerunga State Nursery. PLANTS available at any time. SEEDS when in season, BEING MOSTLY OF SHORT VITALITY, should be promptly applied for.

RUBBERS. KAPOCK, CARDAMOM, and especially rare Plants, or Seedlings difficult to raise, 1s. each, or 10s. per dozen; others, 6d. each, or 5s. per dozen. Seed, 6d. per packet. Plus packing, railage, or postage.

Remittances should accompany applications.

Lists of Tropical Economic Plants available may be obtained on application to the Manager, Kamerunga State Nursery, Cairns, North Queensland.

RUBBER SEEDS AND PLANTS.

Variety and Name.	Plants or Seed.	When Available.	Price.
Rambong or Assam (<i>Ficus elastica</i>) ...	Plants only	Any time ...	1s. each, 10s. per doz.
Para Rubber (<i>Hevea brasiliensis</i>) ...	Plants ...	" " ...	" " "
" " " " ...	Seed ...	Feb. to April	1s. per oz. (about 1 doz.)
Central American (<i>Castilloa elastica</i>) ...	Plants ...	Any time ...	1s. each, 10s. per doz.
" " " " ...	Seed ...	Nov. to Jan.	1s. per oz. (about 100)
Iré or Logos Rubber (<i>Funtumia elastica</i>) ...	Plants only	Any time ...	1s. each, 12s. per doz.
Ceara Rubber (<i>Manihot Glaziovii</i>) ..	Seed only	, , ...	1s. per oz. (about 50)
West African Rubber (<i>Tabernaemontana</i>) ...	Plants ...	" " ...	1s. each, 10s. per doz.
" " " (<i>Crassa</i>) ...	Seed ...	" " ...	1s. per oz. (about 100)

Above prices are for delivery on the Nursery. If applicants wish Plants or Seed sent, packing, postages, railage to port, &c., are extra. Seed and small quantities of Plants may be sent by parcels post at purchaser's risk. Plants, being delicate, do not travel well by post.

Hessian-covered cases, holding one to three dozen, cost 4s. 6d. extra f.o.b. Cairns, whence they will be shipped "freight on." The demand for Seed being large and the supply limited, Orders received, with remittance, will be booked and completed as soon as Seed is available.

NOTICE OF SHOW DATES.

We wish to draw the attention of Secretaries of Agricultural and Pastoral Societies and Associations to the importance of promptly notifying the Editor of any change in the dates on which shows are to be held. A case occurred in June last, in which the date of a certain society's show was set down in this Journal and in the daily metropolitan papers as the 4th and 5th June. An officer of this Department was just about to leave Brisbane to attend the show as a judge when, on his way to the steamer, he fortunately met another judge, who informed him that the show had been postponed until the 11th June. Had due notice of the change been sent to us, this would not have occurred. Had the officer in question left by the boat, he would have been unable to leave the town in the North for a week, and all his engagements in various districts would have had to be cancelled.

IMPORTS OF FRUIT, ETC., INTO VICTORIA.

The following Regulations relating to the importation of fruit, plants, trees, &c., into the State of Victoria have been promulgated by the Victorian Minister for Agriculture:—

1. Inspectors are authorised and required to charge the following fees and expenses for examining citrus fruits imported, introduced, or brought into Victoria:—

For each case or package not exceeding one bushel in capacity, One halfpenny.

The inspection fee for bananas is now 1d. per bunch or case.

For each case or package exceeding one bushel in capacity, One penny.

2. Such fees and expenses shall be paid by the owner or the person in possession to the inspector.



TREWHELLA BROS.' LATEST PATENT.

THE MONKEY JACK.

Specially Designed for Grubbing. Twice the Power, Twice the Lift of their well-known Wallaby Jack." Inquire about them. Write for Particulars.

MR. ARTHUR ROBINSON, 57 to 59 Adelaide street, Brisbane, is in Charge of our Distributing Depot in Queensland. Stocks are held by the Leading Ironmongers throughout Australia.

This type has been adopted and is now in use by the Agricultural Department and Labour Bureau of Queensland for Clearing Experimental Farms, Roads through Forest Land, &c.

INQUIRIES SOLICITED.

TREWHELLA BROS.,
Engineers, Trentham, Victoria.

LIST OF AGRICULTURAL, HORTICULTURAL, AND PASTORAL SOCIETIES AND ASSOCIATIONS IN QUEENSLAND.

Postal Address.	Name of Society.	Name of Secretary.	Show Dates.	
			1907.	1908.
Allora ...	Central Downs Agricultural and Horticultural Association	J. H. Buxton ...	7 Feb.	
Allora ...	The Allora Farmers' Progress Association	P. Donovan ...		
Amby ...	Amby Farmers' Association ...	W. Jas. Sullivan ...		
Atherton ...	Barron Valley Agricultural, Pastoral, and Industrial Association	G. Bardon ...	24 and 25 July	
Atherton ...	The Atherton District Farmers' Association	Fredk. Stewart ...		
Ayr ...	Lower Burdekin Farmers' Association	G. S. Mackersie ...		
Ayr ...	Lower Burdekin Pastoral, Agricultural, and Industrial Association	I. A. Holmes ...		
Beaudesert ...	Logan and Albert Pastoral and Agricultural Society	A. Winship ...	1 May	
Beenleigh ...	Agricultural and Pastoral Society of Southern Queensland	Wilson Holliday ...	20 Sept.	
Beenleigh ...	Logan Farming and Industrial Association	Wm. G. Winnett, Loganlea		
Biggenden ...	Biggenden Agricultural and Pastoral Society	C. J. Stephensen ...	24 and 25 July	9 and 10 July
Blackall ...	Barcoo Pastoral Society ...	...	28 and 29 May	
Blackbutt ...	Farmers' Progress Association ...	John Dreghorn ...		
Bconah ...	Fassifern and Dugandan Agricultural and Pastoral Association	C. E. Mackenzie ...	27 and 28 June	13 and 14 May
Booyal ...	Booyal Farmers' Progress Association	N. Rosenlund ...		
Bowen ...	Pastoral, Agricultural, and Mining Association	Geo. Turner ...		
Bowen ...	Proserpine Farmers and Settlers' Association	J. Cooper ...		
Bowen(Proserpine) ...	Cannon Valley Farmers and Settlers' Association	J. H. Ryan ...		
Bowen ...	Bowen Farmers and Fruitgrowers' Association	H. C. Smethurst ...		
Brisbane ...	Horticultural Society of Queensland	F. W. Woodruffe ...		
Brisbane ...	Queensland Acclimatisation Society	E. Grimley ...		
Brisbane ...	National Agricultural and Industrial Association of Queensland	Charles A. Arvier	13, 14, 15, 16, and 17 Aug.	10, 11, 12, 13, 14, & 15 Aug.
Brisbane ...	United Pastoralists' Association ...	Fredk. Ranson ...		
Brisbane ...	Queensland Beekeepers' Association	F. Wilsdon Smith		
Brisbane ...	Queensland Chamber of Agriculture	F. W. Peek ...		
Brisbane ...	Queensland Citrus-growers' Association	R. M. Cooper ...		
Brisbane ...	Combined Moreton Association ...	Wm. Ewart ...		
Brookfield ...	The Brookfield and Pullen Vale Farmers, Dairymen, and Fruitgrowers' Association	W. R. Moon ...		
Buderim ...	Buderim Mountain Coffee and Fruit-growers' Association	G. O. Burnett ...		
Buderim Mt. ...	North Coast Central Association ...	James Lindsay ...		
Bundaberg ...	Bundaberg Horticultural and Industrial Society	H. E. Ashley ...		
Bundaberg ...	Council of Agriculture ...	H. J. Page ...		
Bundaberg ...	Bundaberg Agricultural, Pastoral, and Industrial Society	H. J. Page ...	29 and 30 May	
Bundaberg ...	Woongarra Canegrowers and Farmers' Association	Thos. W. Walker		
Burpengary ...	Burpengary Farmers' Association ...	F. W. Uhlmann ...		
Cairns ...	Aloombah Farmers' Association ...	N. P. Petersen ...		
Cairns ...	Cairns Agricultural, Pastoral, and Mining Association	J. Reid ...	5 and 6 Sept.	
Cairns ...	Cairns District Coffee-growers' Association	L. Battinson ...		
Cairns ...	Cairns District United Farmers' Association	Wm. Griffin ...		
Cairns ...	Hambledon Planters' Association ...	A. W. Hawkins ...		
Cardwell ...	Rockingham Progress Association ...	T. E. Fitzsimmons		

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Show Dates.	
			1907.	1908.
Cawdor ...	Highfields and Cawdor Farmers' Association	H. Franken ...		
Cedar Pocket, <i>via</i> Gympie	Cedar Pocket Farmers' Progress Association	Samuel Ericksen ...		
Charleville ...	Central Warrego Pastoral and Agricultural Association	G. M. Bell ...	14 and 15 May	
Charters Towers	Towers Pastoral, Agricultural, and Mining Association	A. H. Pritchard ...	18 and 19 June	
Childers ...	Isis Agricultural Association ...	H. Epps ...		
Childers ...	Doolbi Mill Branch, Isis Agricultural Association	R. S. Rankin ...		
Childers ...	Childers Mill Branch, Isis Agricultural Association	H. Epps ...		
Childers ...	Childers Pastoral, Agricultural, and Industrial Society	A. Eastaughffe ...	12, 13, and 14 June	
Childers ...	The Childers Mill Canegrowers' Association	A. Eastaughffe ...		
Clermont ...	Peak Downs Pastoral, Horticultural, and Agricultural Society	F. Leysley ...		
Cleveland ...	Cleveland Horticultural Society ...	Miles R. Fox ...	31 Aug.	
Clifton ...	Darling Downs Pastoral, Agricultural, and Industrial Association	S. J. B. Just ...		
Columboola ...	The Columboola Farmers and Settlers' Association	Geo. T. Sutton ...		
Coochin ...	The Coochin Farmers' Progress Association	J. T. W. McLaughlin		
Cooyar ...	Yeraman Creek Farmers' Progress Association	M. Harland ...		
Cooran ...	Cooran Progress and Agricultural Association	A. G. Bosanquet ...		
Crow's Nest	The Crow's Nest Agricultural and Horticultural Society	James Gleeson ...		
Croydon ...	The Gulf Mining, Pastoral, and Industrial Association	V. Creagh ...		
Cunnamulla	South Warrego Pastoral Association	J. Winward ...		
Dalby ...	Northern Downs Pastoral and Agricultural Association	E. Watt ...		
Dallarnil Scrub, <i>via</i> Degilbo	Dallarnil Farmers and Dairymen's Progress Association	Vincent H. Jones		
Dallarnil ...	The Dallarnil and Woowoonga Sugar-growers' Association	John C. Robertson		
Dundowran, <i>via</i> Maryborough	Dundowran and Takura Settlers' Association	H. J. E. Tooth ...		
Esk ...	Esk Agricultural, Pastoral, and Industrial Society	J. G. Smith ...	30 April	26 May
Eudlo ...	Eudlo Farmers and Fruitgrowers' Progress Association	Walter T. Jeremy		
Flagstone Ck., <i>via</i> Helidon	Flagstone Creek Farmers' Progress Association	James Scanlan ...		
Forest Hill ...	Forest Hill Agricultural and Progress Association	Wm. Jones ...		
Gayndah ...	Gayndah Pastoral, Industrial, Agricultural, and Horticultural Association	Thomas McMahon	25 and 26 June	
Gayndah ...	Reid's Creek Farmers' Progress Association	James W. Small ...		
Geraldton ...	Johnstone River Sugar-growers and Manufacturers' Association	W. Stevenson ...		
Gin Gin ...	Currajong and Gin Gin Agricultural and Pastoral Society	J. R. Hamilton ...	15 June	
Gladstone ...	Gladstone Pastoral and Agricultural Association	W. J. Manning ...		
Gladstone ...	Port Curtis Agricultural, Pastoral, and Mining Association	J. T. W. Brown ...		
Gooburrum, Bundaberg	Gooburrum Farmers and Cane-growers' Association	W. J. Tutin ...		
Goombungee	Goombungee Farmers' Association ...	Thos. Smith ...	23 Jan.	
Goondiwindi	MacIntyre River Pastoral and Agricultural Society	E. T. Drake ...	3 and 4 April	
Gracemere ...	The Gracemere District Farmers and Progress Association	Arthur E. Fisher ...		
Gympie ...	Agricultural, Mining, and Pastoral Society	F. Vaughan ...	21 and 22 Aug.	

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Show Dates.	
			1907.	1908.
Gympie ...	Chatsworth Farmers' Progress Association	W. Allen		
Gympie ...	Gympie Horticultural Society ...	Charles Brasch ...		
Gympie ...	Woondum and Brisbane Road Farmers' Progress Association	J. Mullaly ...		
Harrisville ...	Harrisville Farmers' Progress Association	W. J. Burnett ...		
Hatton Vale	Hatton Vale Farmers' Progress Association	P. Sharry, junr. ...		
Headington Hill	Queensland Farmers' Association ...	J. E. Stehn ...		
Helidon ...	Helidon Scrub Farmers' Progress Association	James Sweeney ...		
Helidon ...	Monkey Creek Farmers' Progress Association, Withcott, Helidon	Thomas Turner ...		
Hendra ...	Nundah Agricultural, Horticultural, and Industrial Association	Geo. A. Patullo ...		
Herbert River	Halifax Planters' Club ...	A. Campbell ...		
Herbert River	Macknade Farmers' Association ...	Edwin S. Waller ...		
Herbert River	Fairford Farmers' Association ...	D. G. Scott ...		
Herbert River	United Farmers' Association ...	D. G. Scott ...		
Herberton ...	Mining, Pastoral, and Agricultural Association	John M. Hollway	1 April	
Hodgson ...	Hodgson and Dargal Farmers' Association	I. Stevenson ...		
Hopetoun ...	Hopetoun Pastoral, Agricultural, and Progressive Association	John Walsh ...		
Hughenden...	Hughenden Pastoral and Agricultural Association	H. G. McLean ...		
Ingham ...	Herbert River Pastoral and Agricultural Association (Agricultural Show)	P. J. Cochrane ...		
Ingham ...	Stone River Farmers' Association ...	W. B. G. Johnson		
Ipswich ...	Ipswich and West Moreton Agricultural and Horticultural Society	P. W. Cameron ...	17 Oct.	
Ipswich ...	Queensland Pastoral and Agricultural Society	J. McGill ...	19, 20, and 21 June	
Ipswich ...	The Amberley Farmers' Progress Association	Clark T. Seymour...		
Kelsey Creek via Bowen	Kelsey Creek Farmers' Progress Association	A. Fontaine ...		
Kolan, North	Kolan Canegrowers and Farmers' Association	Jas. H. Hendy ...		
Kilkivan ...	Kilkivan District Farmers and Settlers' Progress Association	M. Bambling ...		
Kingaroy ...	Kingaroy Farmer's Association ...	C. H. Hooper ...		
Kingaroy ...	South Burnett Agricultural, Pastoral, and Industrial Society	...	29 and 30 Aug.	
Laidley ...	Lockyer Agricultural and Industrial Society (at Gatton)	W. A. McIlwraith		
Lakeside ...	Mungore Farmers' Association ...	C. C. Ridley ...		
Longreach ...	Longreach Pastoral and Agricultural Society	J. P. Peterson ...	6 and 7 May	
Lowood ...	The Lowood and Tarampa Pastoral and Agricultural Association	D. E. C. Kroger ...	Sept.	
Ma Ma Creek, via Grantham	Ma Ma Creek Farmers' Progress Association	A. McKenzie ...		
Mackay ...	Agricultural, Pastoral, and Mining Association	F. Black ...		
Mackay ...	Pioneer River Farmers and Graziers' Association	J. P. Moule ...	4 and 5 June	
Mapleton ...	Fruitgrowers and Farmers' Progressive Association	W. J. Smith ...		
Mareeba ...	Mareeba Mining, Pastoral, and Agricultural Association	F. Cruckshank ...	3 and 4 June	
Maryborough	Maryborough Horticultural Society...	H. A. Jone ...		
Maryborough	The Island Farmers' Progress Association	H. Simpson, junr.		
Maryborough	Wide Bay and Burnett Agricultural and Horticultural Society	A. H. Jones ...	22, 23, and 24 May	24, 25, and 26 June
Miriam Vale	Miriam Vale Farmers' Association	J. Spencer ...		
Montville ...	Montville Fruitgrowers and Farmers' Progress Association	C. J. Wyer ...		

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Show Dates.	
			1907.	1908.
Mooloolah ..	Mooloolah Farmers and Fruitgrowers' Progress Association	G. S. Skerman ...		
Mosman ...	Mosman District Agricultural Society	G. W. Muntz ...		
Mount Cotton	Mount Cotton and Redland Bay Fruitgrowers and Farmers' Association	W. E. Burns ...		
Mount Mee...	Mount Mee Farmers' Association ...	Jas. H. Robinson ...		
Mount Morgan	Mount Morgan Agricultural, Pastoral, and Poultry Society	J. S. Lyle ...		
Mount Ubi, Eumundi	The Kenilworth Farmers' Association	H. Pickering ...		
Nambour ...	Dulong and Kureelpa Farmers and Canegrowers' Association	A. A. Petrie ...		
Nambour ...	Obi Obi Farmers and Dairymen's Progressive Association	H. Robinson ...		
Nanango ...	Nanango Agricultural, Pastoral, and Mineral Society	J. W. Sigley ...	25 and 26 April	
Nanango ...	North Barker's Creek Farmers' Association	A. Becker ...		
Nerang ...	Southern Queensland and Border Agricultural and Pastoral Association	H. J. Cooper ...	18 Oct.	
North Isis ...	North Isis Canegrowers' Association	T. E. Barnes ...		
Oakey ...	Oakey Agricultural and Pastoral Society	E. R. Pace ...		
Palmwoods ...	Palmwoods Industrial Fruitgrowers' Progress Association	H. Taylor ...		
Peachester, <i>via</i> Beerwah, N.C. Line	The Peachester Progress Association	W. Vieritz ...		
Pittsworth ...	Pittsworth Pastoral, Agricultural, and Horticultural Association	John J. Daniel, senr.	30 Jan.	
Pomona ...	Pomona Agricultural and Progress Association	H. J. Scott ...		
Port Douglas	Port Douglas and Mosman Pastoral, Agricultural, Horticultural, and Mining Association	H. McMahon ...	August (Date not fixed)	
Proserpine ...	Preston Farmers and Settlers' Association	T. Duval ...		
Proserpine ...	Preston Farmers and Canegrowers' Association	R. C. Dagg ...		
Proserpine ...	Cannon Valley and District Farmers' Progress Association	W. A. Compton ...		
Roadvale ...	Roadvale Progress Association ...	Henry Clark ...		
Rockhampton	Alton Downs Farmers' Association...	G. T. Crook ...		
Rockhampton	Central Queensland Farmers and Selectors' Association	T. Whitely, Coowonga		
Rockhampton	Central Queensland Stockowners' Association	R. R. Dawbarn ...		
Rockhampton	Rockhampton Agricultural Society...	A. C. Lyons ...	20, 21, and 22 June	
Roma ...	Western Pastoral and Agricultural Association of Queensland	Angus McPherson	16 and 17 July	
Roma ...	Yingerbay Farmers' Association ...	R. Frederick ...		
Roma (Blythdale)	Warooby Farmers' Association ...	Geo. Munt... ..		
Roma ...	Euthulla Farmers and Fruitgrowers' Association	J. Bates ...		
Roma ...	The United Maranoa Farmers' Association	R. Frederick, senr.		
Rosewood ...	Farmers' Club	P. H. Adams ...	29 and 30 May	
Southport ...	Southport Horticultural Society ...	E. Fass ...		
Springure ...	Queensland Pastoral Society...	G. R. Milliken ...		
Stanthorpe ...	Border Pastoral, Agricultural, and Mining Society	Geo. Simcocks ...	21 and 22 Feb.	20 and 21 Feb.
St. George ...	Balonne Pastoral and Agricultural Society	T. M. Cummings ...	7 and 8 May	
Sydney ...	Royal Agricultural Society of New South Wales	...	7, 8, 9, and 10 Aug.	

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Show Dates.	
			1907.	1908.
Takura (Pialba line)	Takura Farmers' Progress Association	S. E. Tooth ...		
Teutoberg ...	Teutoberg Farmers' Progress Association	E. M. Nothling ...		
Tinana ...	Tinana Fruitgrowers and Farmers' Association	H. G. Habler ..		
Tingoora ...	Tingoora Farmers' Progress Association	Arthur Boisen ...	6, 7, 8, and 9 Aug.	
Toowoomba...	Royal Agricultural Society of Queensland	G. A. Leichney ...		
Townsville ...	Townsville Pastoral, Agricultural, and Industrial Association (formerly North Queensland Pastoral and Agricultural Association)	J. N. Parkes ...	2 and 3 July	
Upper Kedron	Upper Kedron Fruitgrowers and Farmers' Association	A. Marshall ... A. Pickering ...		
Wallumbilla	Wallumbilla Farmers' Association ...	A. Budd ...		
Warren Siding	The Stanwell United District Farmers' Union	G. N. Terry ...		
Warwick ...	Eastern Downs Horticultural and Agricultural Association	F. H. Selke ...	12, 13, and 14 Feb.	
Wellington Point	Wellington Point Agricultural, Horticultural, and Industrial Association	Victor Drury ...	18 Sept.	
West Haldon, <i>vid</i> Greenmount	West Haldon Farmers' Progress Association	A. E. Ayris ...		
Wondai ..	Mondure Farmers' Progress Association	S. R. Monteith ...		
Woolloomgabba	Queensland Dairy Herdbook Society	Alfred Gorrie ...		
Woombye ...	Maroochy Pastoral, Agricultural, Horticultural, and Industrial Society	P. S. Hungerford...		
Woombye ...	Woombye Fruitgrowers' and Progress Association	E. E. McNall ...		
Wooroolin ...	Wooroolin Farmers' Progress Association	A. Deighton ...		
Wooroolin ...	Wooroolin Farmers' Union ...	H. N. Campbell ...		
Yandina ...	Yandina Agricultural and Progress Association	W. R. Brayden ...		
Yingerbay ...	United Farmers' Association of the Maranoa	R. Frederich ...		
Zillmere ...	Zillmere Horticultural Society ...	E. H. Decker ...		

Societies and associations desirous of being registered and placed on the above list must make application to that effect, and forward to the Under Secretary for Agriculture and Stock the following particulars:—

Number of members who have paid their subscriptions for 1907.

Number of meetings held by the Society during 1907.

Date of the last meeting.

Name of the Secretary for 1908.

Public Announcements.

The EDITOR will be glad to receive any papers of special merit which may be read at meetings of Agricultural and Pastoral Associations in Queensland, reserving, however, the right to decide whether their value and importance will justify their publication.

Secretaries of Associations are requested to be good enough to forward to the EDITOR, as early as possible, the dates of forthcoming Shows, as it is important in the interests of the Associations that these dates should be published.

To enable recipients of the *Queensland Agricultural Journal* to have the half-yearly volume bound, covers in boards and cloth will be supplied from this office on application to the Under Secretary for Agriculture and Stock. Applications must be accompanied by a remittance of SIXPENCE to cover cost. For the convenience of those who are not within reach of a bookbinder, a Special Cover has been designed, which obviates the necessity for binding. These covers will be supplied at ONE SHILLING each.

In order to avoid disappointment, correspondents who wish for replies to questions in the *Journal* are requested to note that it is imperative that all matter for publication on the first day of any month should reach the Editor by the 15th of the previous month.

For the information of those who are desirous of communicating with the managers of State farms, we give their names and addresses below:—Queensland Agricultural College, Gatton, principal, J. Mahon; Westbrook State Farm, Westbrook, manager, C. Ross; Biggenden State Farm, Biggenden, manager, D. Macpherson; Hermitage State Farm, Warwick, manager, John Liverseed; Gindie State Farm, manager, R. Jarrott; Kamerunga State Nursery, Cairns, manager, Howard Newport; Roma State Farm, manager, R. Soutter; Botanic Gardens, director, J. F. Bailey.

It is notified, for the information of intending Visitors to the Queensland Agricultural College, that the Second Wednesday in each month has been set apart for the reception of Parties of Farmers and others desirous of inspecting the Institution. Supplies of hot water and milk can be obtained at the College, if desired.

IMPORTATION OF PLANTS, FRUIT, SEEDS, ETC., INTO CAPE COLONY.

The Department of Agriculture and Stock has received from the Acting Prime Minister of the Commonwealth a copy of a Proclamation issued by the Governor in Council of Cape Colony, embodying revised regulations with regard to the introduction of plants, trees, fruit, seeds, roots, &c., into that colony from overseas, by which such introduction of eucalyptus, acacia, coniferous trees, and certain stone fruits is prohibited. Those interested in the export of such plants may obtain all information on the subject from the Department of Agriculture and Stock, Brisbane.

QUEENSLAND AGRICULTURAL COLLEGE.

FOR SALE.

PURE-BRED PIGS, all from imported stock, including Berkshire and Large and Middle Yorkshires. BOARS, 2 GUINEAS; SOWS, 1 GUINEA each; f.o.b. Gatton.

Poultry of the following breeds:—Brown Leghorns, Silver-grey Dorkings, Old English Spangled Game, Plymouth Rocks, Minorcas, White Wyandottes, Silver-laced Wyandottes, Black Orpingtons, Buff Orpingtons, White Leghorns. Prices, from 10s. each, f.o.b. Gatton.

Eggs of the above breeds are available in the season—1st July to 31st December; and nine out of each setting are guaranteed fertile. Should less than nine prove to be fertile, the infertiles will be replaced if returned carriage paid. This rule will be strictly adhered to. Price, 10s. per setting, for all breeds, f.o.b. Gatton.

Applications for Setting of Eggs, accompanied by Remittance, may be made to the Principal, Queensland Agricultural College.

A few Settings of American Bronze-wing Turkey Eggs will be available at 15s. per setting, f.o.b. Gatton.

As it has been decided that all surplus stock is to be disposed of by auction sales to be held annually, no pure-bred bulls will be available for private sale.

The following Stud Animals are available for Service at the College Farm, at a charge of 10s. for pure-bred and 5s. for grade cows:—Imported Shorthorn, Jersey, Holstein, and Guernsey Bulls.

The following Bulls imported from Great Britain are also available for Service at a charge of 10s. for all cows:—

Ayrshire Bull, SPECULATION.

Shorthorn Bull, BURTON SPOT.

Sows may be served also by imported Berkshire, British Large Black, and Yorkshire Pigs, at a charge of 5s. for each service.

Paspalum Roots will be supplied to purchasers at 2s. 6d. per sack, f.o.b. Gatton. Applicants will be supplied on receipt of remittance to the amount of the order.

Small quantities of Roots of the following Grasses will also be available for disposal:—Rhodes Grass, Wonder Grass.

Seeds for Sale:—Cowpea, Sunflower, Sorghums, Panicum.

JOHN MAHON, Principal.

"THE QUEENSLAND FLORA"

BY F. MANSON BAILEY, F.L.S.,

Colonial Botanist of Queensland.

WITH PLATES ILLUSTRATING SOME RARE SPECIES.

IN SIX PARTS, OF BETWEEN 300 AND 400 PAGES EACH, ROYAL OCTAVO.

Price, £1 10s. for Complete Work.

Obtainable at the DEPARTMENT of AGRICULTURE and STOCK.

"QUEENSLAND GOVERNMENT MINING JOURNAL,"

PUBLISHED MONTHLY,

(Under the Authority of the Mines Department),

And contains the most Authentic Information pertaining to Mining Matters in Queensland.

Publishers: GORDON & GOTCH, Queen street, Brisbane, and 15 St. Bride street, Ludgate Circus, London, E.C.

Copies can likewise be obtained from Booksellers on the Mining Fields of the State and in the Australasian Capitals. Also, from the

QUEENSLAND GOVERNMENT OFFICE,

Westminster Chambers, Victoria street, London, S.W.

QUEENSLAND AGRICULTURAL COLLEGE.

The College, which is situated within 4 miles of Gatton and 1 mile from the College Railway Siding, comprises 1,692 acres, and the buildings can accommodate 60 Students.

TERMS.

TWENTY-SEVEN POUNDS per annum, paid half-yearly in advance. Students are also charged One Pound per annum each for medical attendance, the sports fund, and for guarantee fee.

The course of instruction includes PRACTICAL AGRICULTURE in all its branches, DAIRYING, GARDENING, STOCK-BREEDING, and MECHANICAL ARTS. Classes are also held daily for THEORETICAL INSTRUCTION in these branches, as well as in SURVEYING, CHEMISTRY, &c.

The College Calendar, giving full particulars, may be obtained on application to the Principal at the College, or to the Under Secretary for Agriculture and Stock, Brisbane.

BURSARIES.

Four bursaries are given annually. An examination for these is held in June or July of each year. Bursaries will be awarded upon the following conditions:—Candidates (males) to be from sixteen to eighteen years of age, of sound constitution, and in good health; they must have resided in the State for the two years immediately preceding the time of their examination for such bursary, or their parents must have resided in the State three years immediately preceding such examination. The bursar is entitled—subject to good behaviour and the pleasure of Parliament—to free board and instruction as a resident student for a period of three years. He is required to take up his residence at the College within one month of the publication of the results of the examination; otherwise he forfeits his right to a bursary.

The AGE of CANDIDATES for Admission to the College as Students is Sixteen Years.

HERMITAGE STATE FARM.

FOR SALE.

PURE-BRED MIDDLE YORKSHIRE BOARS (Progeny of Imported Stock), £2 2s. each on rail at Hermitage.

TURKEY GOBBLERS, 11 months old, THIRTY SHILLINGS each on rail at Hermitage.

FOR SERVICE—

Middle Yorkshire Boar, HOLYWELL CHUB (Imported)

Berkshire Boar, YOUNG BOOMERANG (Imported).

Full particulars on application to THE MANAGER, State Farm, Hermitage.

STATE FARM, WESTBROOK.

CANARY GRASS

(*Phalaris commutata*).

This is the best all-the-year-round grass as yet introduced for Green Cutting, Hay, or Feeding-off. Planting should be done during the Winter and Early Spring, before hot dry weather sets in. It is particularly luxuriant in winter, and behaves remarkably well during the hot dry months. The Manager believes it will flourish in any part of the Commonwealth.

Rootlings: Two SHILLINGS AND SIXPENCE per Dozen, or Twelve SHILLINGS per 100.

To expedite delivery, application should be made direct to the MANAGER, Westbrook State Farm, together with remittance to cover the cost of Rootlets and Freight.

STATE SCHOOLS will be supplied with Small Parcels of Rootlings of the above FREE OF CHARGE.

Applications, however, must include cost of freight.

POULTRY.

GOLDEN WYANDOTTE COCKERELS, from Heavy Laying Strains, FOR SALE. Price: SEVEN SHILLINGS AND SIXPENCE each. Apply to

THE MANAGER.

PURCHASE OF STOCK AND PRODUCE FROM THE DEPARTMENT OF AGRICULTURE

Purchasers of Stock and Produce, Plants, Seed, &c., from the State Farms and Agricultural College are reminded that Sales from these Institutions are made for Cash only. Persons desirous of making purchases should, therefore, first ascertain the cost of whatever articles they desire to obtain, and remit the full purchase-money when sending an order.

COTTON SEED.

We have been requested to notify Cotton Planters that Messrs. J. KITCHEN AND SONS, Limited, are prepared to supply UPLAND COTTON SEED FREE for this year's planting, and that the firm will pay the railage on all Cotton consigned to them during this year and 1907. The railage which has been already charged to Cotton Suppliers will be refunded to those who have sent in supplies.

STATE NURSERY, KAMERUNGA, CAIRNS.

RUBBER, COCOA, KOLA-NUT, CAROB BEAN, KAPOCK, VANILLA, CARDAMOM, BREADFRUIT, DIVI-DIVI, GINGER, AND OTHER VALUABLE TROPICAL ECONOMIC PLANTS FOR SALE, AT NOMINAL RATES, TO SETTLERS AND FARMERS.

The Instructor in Tropical Agriculture notifies that PLANTS or SEEDS of the above useful and valuable AUXILIARY PRODUCTS may be obtained by application to the Manager, Kamerunga State Nursery. PLANTS available at any time. SEEDS when in season, BEING MOSTLY OF SHORT VITALITY, should be promptly applied for.

RUBBERS, KAPOCK, CARDAMOM, and especially rare Plants, or Seedlings difficult to raise, 1s. each, or 10s. per dozen; others, 6d. each, or 5s. per dozen. Seed, 6d. per packet. Plus packing, railage, or postage.

Remittances should accompany applications.

Lists of Tropical Economic Plants available may be obtained on application to the Manager, Kamerunga State Nursery, Cairns, North Queensland.

RUBBER SEEDS AND PLANTS.

Variety and Name.	Plants or Seed.	When Available.	Price.
Rambong or Assam (<i>Ficus elastica</i>)	Plants only	Any time ...	1s. each, 10s. per doz.
Para Rubber (<i>Hevea braziliensis</i>)	Plants ...	„ „ ...	„
„ „ „ „	Seed ...	Feb. to April	1s. per oz. (about 1 doz
Central American (<i>Castilloa elastica</i>)	Plants ...	Any time ...	1s. each, 10s. per doz.
„ „ „ „	Seed ...	Nov. to Jan.	1s. per oz. (about 100)
Iré or Logos Rubber (<i>Funtumia elastica</i>)	Plants only	Any time ...	1s. each, 12s. per doz.
Ceara Rubber (<i>Manihot Glaziovii</i>)	Seed only	, , ...	1s. per oz. (about 50)
West African Rubber (<i>Tabernaemontana</i>)	Plants ...	„ „ ...	1s. each, 10s. per doz.
„ „ „ (<i>Crassa</i>)	Seed ...	„ „ ...	1s. per oz. (about 100)

Above prices are for delivery on the Nursery. If applicants wish Plants or Seed sent, packing, postages, railage to port, &c., are extra. Seed and small quantities of Plants may be sent by parcels post at purchaser's risk. Plants, being delicate, do not travel well by post.

Hessian-covered cases, holding one to three dozen, cost 4s. 6d. extra f.o.b. Cairns, whence they will be shipped "freight on." The demand for Seed being large and the supply limited, Orders received, with remittance, will be booked and completed as soon as Seed is available.

NOTICE OF SHOW DATES.

We wish to draw the attention of Secretaries of Agricultural and Pastoral Societies and Associations to the importance of promptly notifying the Editor of any change in the dates on which shows are to be held. A case occurred in June last, in which the date of a certain society's show was set down in this Journal and in the daily metropolitan papers as the 4th and 5th June. An officer of this Department was just about to leave Brisbane to attend the show as a judge when, on his way to the steamer, he fortunately met another judge, who informed him that the show had been postponed until the 11th June. Had due notice of the change been sent to us, this would not have occurred. Had the officer in question left by the boat, he would have been unable to leave the town in the North for a week, and all his engagements in various districts would have had to be cancelled.

IMPORTS OF FRUIT, ETC., INTO VICTORIA.

The following Regulations relating to the importation of fruit, plants, trees, &c., into the State of Victoria have been promulgated by the Victorian Minister for Agriculture:—

1. Inspectors are authorised and required to charge the following fees and expenses for examining citrus fruits imported, introduced, or brought into Victoria:—

For each case or package not exceeding one bushel in capacity, One halfpenny.

The inspection fee for bananas is now 1d. per bunch or case.

For each case or package exceeding one bushel in capacity, One penny.

2. Such fees and expenses shall be paid by the owner or the person in possession to the inspector.

CLEARING LAND.

TREWHELLA BROS.' PATENT JACKS ARE
UNSURPASSED FOR THIS WORK.

THE
MONKEY JACK

Is Specially Designed for
Heavier Stump-grubbing
and Tree-extracting.



THE
WALLABY JACK

Is Specially Designed for
Lighter Stump-grubbing
and Tree-extracting.

GIVES ONE MAN MORE THAN THE POWER OF TEN.
SAVES ITS COST EASILY WITHIN THREE MONTHS.

Inquire Particulars of Leading Ironmongers and Storekeepers; or Send for Catalogues to

A. ROBINSON,
55 ADELAIDE STREET, BRISBANE. — (Queensland Depot.)

LIST OF AGRICULTURAL, HORTICULTURAL, AND PASTORAL SOCIETIES AND ASSOCIATIONS IN QUEENSLAND.

Postal Address.	Name of Society.	Name of Secretary.	Show Dates.	
			1907.	1908.
Allora ...	Central Downs Agricultural and Horticultural Association	J. H. Buxton ...	7 Feb.	11 and 12 Feb.
Allora ...	The Allora Farmers' Progress Association	P. Donovan ...		
Amby ...	Amby Farmers' Association ...	W. Jas. Sullivan ...		
Atherton ...	Barron Valley Agricultural, Pastoral, and Industrial Association	G. Bardon ...	24 and 25 July	
Atherton ...	The Atherton District Farmers' Association	Fredk. Stewart ...		
Ayr ...	Lower Burdekin Farmers' Association	G. S. Mackersie ...		
Ayr ...	Lower Burdekin Pastoral, Agricultural, and Industrial Association	I. A. Holmes ...		
Beaudesert ...	Logan and Albert Pastoral and Agricultural Society	A. Winship ...	1 May	
Beenleigh ...	Agricultural and Pastoral Society of Southern Queensland	Wilson Holliday ...	20 Sept.	
Beenleigh ...	Logan Farming and Industrial Association	Wm. G. Winnett, Loganlea		
Biggenden ...	Biggenden Agricultural and Pastoral Society	C. J. Stephensen ...	24 and 25 July	9 and 10 July
Blackall ...	Barcoo Pastoral Society ...	...	28 and 29 May	
Blackbutt ...	Farmers' Progress Association ...	John Dreghorn ...		
Boonah ...	Fassifern and Dugandan Agricultural and Pastoral Association	C. E. Mackenzie ...	27 and 28 June	13 and 14 May
Booyal ...	Booyal Farmers' Progress Association	N. Rosenlund ...		
Bowen ...	Pastoral, Agricultural, and Mining Association	A. W. Kirke ...		
Bowen ...	Proserpine Farmers and Settlers' Association	J. Cooper ...		
Bowen(Proserpine) ...	Cannon Valley Farmers and Settlers' Association	J. H. Ryan ...		
Bowen ...	Bowen Farmers and Fruitgrowers' Association	H. C. Smethurst ...		
Brisbane ...	Horticultural Society of Queensland	F. W. Woodruffe ...		
Brisbane ...	Queensland Acclimatisation Society	E. Grimley ...		
Brisbane ...	National Agricultural and Industrial Association of Queensland	Charles A. Arvier	13, 14, 15, 16, and 17 Aug.	10, 11, 12, 13, 14, & 15 Aug.
Brisbane ...	United Pastoralists' Association ...	Fredk. Ranson ...		
Brisbane ...	Queensland Beekeepers' Association	F. Wilsdon Smith		
Brisbane ...	Queensland Chamber of Agriculture	F. W. Peek ...		
Brisbane ...	Queensland Citrus-growers' Association	R. M. Cooper ...		
Brisbane ...	Combined Moreton Association ...	Wm. Ewart ...		
Brookfield ...	The Brookfield and Pullen Vale Farmers, Dairymen, and Fruitgrowers' Association	W. R. Moon ...		
Buderim ...	Buderim Mountain Coffee and Fruitgrowers' Association	G. O. Burnett ...		
Buderim Mt. ...	North Coast Central Association ...	James Lindsay ...		
Bundaberg ...	Bundaberg Horticultural and Industrial Society	H. E. Ashley ...		
Bundaberg ...	Council of Agriculture ...	H. J. Page ...		
Bundaberg ...	Bundaberg Agricultural, Pastoral, and Industrial Society	H. J. Page ...	29 and 30 May	
Bundaberg ...	Woongarra Canegrowers and Farmers' Association	Thos. W. Walker		
Burpengary...	Burpengary Farmers' Association ...	F. W. Uhlmann ...		
Cairns ...	Aloombah Farmers' Association ...	N. P. Petersen ...		
Cairns ...	Cairns Agricultural, Pastoral, and Mining Association	J. Reid ...	5 and 6 Sept.	
Cairns ...	Cairns District Coffee-growers' Association	L. Battinson ...		
Cairns ...	Cairns District United Farmers' Association	Wm. Griffin ...		
Cairns ...	Hambleton Planters' Association ...	A. W. Hawkins ...		
Cardwell ...	Rockingham Progress Association ...	T. E. Fitzsimmons		

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Show Dates.	
			1907.	1908.
Cawdor ...	Highfields and Cawdor Farmers' Association	H. Franken ...		
Cedar Pocket, <i>via</i> Gympie	Cedar Pocket Farmers' Progress Association	Samuel Ericksen ...		
Charleville ...	Central Warrego Pastoral and Agricultural Association	G. M. Bell ...	14 and 15 May	
Charters Towers	Towers Pastoral, Agricultural, and Mining Association	A. H. Pritchard ...	18 and 19 June	
Childers ...	Isis Agricultural Association ...	H. Epps ...		
Childers ...	Doolbi Mill Branch, Isis Agricultural Association	R. S. Rankin ...		
Childers ...	Childers Mill Branch, Isis Agricultural Association	H. Epps ...		
Childers ...	Childers Pastoral, Agricultural, and Industrial Society	A. Eastaughffe ...	12, 13, and 14 June	
Childers ...	The Childers Mill Canegrowers' Association	A. Eastaughffe ...		
Clermont ...	Peak Downs Pastoral, Horticultural, and Agricultural Society	F. Leysley ..		
Cleveland ...	Cleveland Horticultural Society ...	Miles R. Fox ...	31 Aug.	
Clifton ...	Darling Downs Pastoral, Agricultural, and Industrial Association	S. J. B. Just ...		
Columboola ...	The Columboola Farmers and Settlers' Association	Geo. T. Sutton ...		
Coochin ...	The Coochin Farmers' Progress Association	J. T. W. McLaughlin		
Cooyar ...	Yeraman Creek Farmers' Progress Association	M. Harland ...		
Cooran ...	Cooran Progress and Agricultural Association	A. G. Bosanquet ...		
Crow's Nest	The Crow's Nest Agricultural and Horticultural Society	James Gleeson ...		
Croydon ...	The Gulf Mining, Pastoral, and Industrial Association	V. Creagh ...		
Cunnamulla	South Warrego Pastoral Association	J. Winward ...		
Dalby ...	Northern Downs Pastoral and Agricultural Association	E. Watt ...		
Dallarnil Scrub, <i>via</i> Degilbo	Dallarnil Farmers and Dairymen's Progress Association	Vincent H. Jones		
Dallarnil ...	The Dallarnil and Woowoonga Sugar-growers' Association	John C. Robertson		
Dundowran, <i>via</i> Mary- borough	Dundowran and Takura Settlers' Association	H. J. E. Tooth ...		
Esk ...	Esk Agricultural, Pastoral, and Industrial Society	J. G. Smith ...	30 April	26 May
Eudlo ...	Eudlo Farmers and Fruitgrowers' Progress Association	Walter T. Jeremy		
Flagstone Ck., <i>via</i> Helidon	Flagstone Creek Farmers' Progress Association	James Scanlan ...		
Forest Hill ...	Forest Hill Agricultural and Progress Association	Wm. Jones ...		
Gayndah ...	Gayndah Pastoral, Industrial, Agricultural, and Horticultural Association	Thomas McMahon	25 and 26 June	
Gayndah ...	Reid's Creek Farmers' Progress Association	George Sutherland		
Geraldton ...	Johnstone River Sugar-growers and Manufacturers' Association	W. Stevenson ...		
Gin Gin ...	Currajong and Gin Gin Agricultural and Pastoral Society	J. R. Hamilton ...	15 June	3 June
Gladstone ...	Gladstone Pastoral and Agricultural Association	W. J. Manning ...		
Gladstone ...	Port Curtis Agricultural, Pastoral, and Mining Association	J. T. W. Brown ...		
Gooburrum, Bundaberg	Gooburrum Farmers and Cane-growers' Association	W. J. Tutin ...		
Goombungee	Goombungee Farmers' Association ...	Thos. Smith ...	23 Jan.	
Goondiwindi	MacIntyre River Pastoral and Agricultural Society	E. T. Drake ...	3 and 4 April	
Gracemere ...	The Gracemere District Farmers and Progress Association	Arthur E. Fisher ...		
Gympie ...	Agricultural, Mining, and Pastoral Society	F. Vaughan ...	21 and 22 Aug.	

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Show Dates.	
			1907.	1908.
Gympie ...	Chatsworth Farmers' Progress Association	W. Allen ..		
Gympie ...	Gympie Horticultural Society ...	Charles Brasch ...		
Gympie ...	Woondum and Brisbane Road Farmers' Progress Association	J. Mullaly ...		
Harrisville ...	Harrisville Farmers' Progress Association	W. J. Burnett ...		
Hatton Vale	Hatton Vale Farmers' Progress Association	P. Sharry, junr. ...		
Headington Hill	Queensland Farmers' Association ...	J. E. Stehn ...		
Helidon ...	Helidon Scrub Farmers' Progress Association	James Sweeney ...		
Helidon ...	Monkey Creek Farmers' Progress Association, Withcott, Helidon	Thomas Turner ...		
Hendra ...	Nundah Agricultural, Horticultural, and Industrial Association	Geo. A. Patullo ...		
Herbert River	Halifax Planters' Club ...	A. Campbell ...		
Herbert River	Macknade Farmers' Association ...	Edwin S. Waller ...		
Herbert River	Fairford Farmers' Association ...	D. G. Scott ...		
Herbert River	United Farmers' Association ...	D. G. Scott ...		
Herberton ...	Mining, Pastoral, and Agricultural Association	John M. Hollway	1 April	
Hodgson ...	Hodgson and Dargal Farmers' Association	I. Stevenson ...		
Hopetoun ...	Hopetoun Pastoral, Agricultural, and Progressive Association	John Walsh ...		
Hughenden...	Hughenden Pastoral and Agricultural Association	H. G. McLean ...		
Ingham ...	Herbert River Pastoral and Agricultural Association (Agricultural Show)	P. J. Cochrane ...		
Ingham ...	Stone River Farmers' Association ...	W. B. G. Johnson		
Ipswich ...	Ipswich and West Moreton Agricultural and Horticultural Society	P. W. Cameron ...	17 Oct.	
Ipswich ...	Queensland Pastoral and Agricultural Society	J. McGill ...	19, 20, and 21 June	
Ipswich ...	The Amberley Farmers' Progress Association	Clark T. Seymour...		
Kelsey Creek via Bowen	Kelsey Creek Farmers' Progress Association	A. Fontaine ...		
Kolan, North	Kolan Canegrowers and Farmers' Association	Jas. H. Hendy ...		
Kilkivan ...	Kilkivan District Farmers and Settlers' Progress Association	M. Bambling ...		
Kingaroy ...	Kingaroy Farmer's Association ...	C. H. Hooper ...		
Kingaroy ...	South Burnett Agricultural, Pastoral, and Industrial Society	...	29 and 30 Aug.	10 and 11 June
Laidley ...	Lockyer Agricultural and Industrial Society (at Gatton)	W. A. McIlwraith		
Lakeside ...	Mungore Farmers' Association ...	C. C. Ridley ...		
Longreach ...	Longreach Pastoral and Agricultural Society	J. P. Peterson ...	6 and 7 May	
Lowood ...	The Lowood and Tarampa Pastoral and Agricultural Association	D. E. C. Kroger ...	Sept.	
Ma Ma Creek, via Grantham	Ma Ma Creek Farmers' Progress Association	A. McKenzie ...		
Mackay ...	Agricultural, Pastoral, and Mining Association	F. Black ...		
Mackay ...	Pioneer River Farmers and Graziers' Association	J. P. Moule ...	4 and 5 June	
Mapleton ...	Fruitgrowers and Farmers' Progressive Association	W. J. Smith ...		
Mareeba ...	Mareeba Mining, Pastoral, and Agricultural Association	F. Cruckshank ...	3 and 4 June	
Maryborough	Maryborough Horticultural Society...	A. H. Jones ...		
Maryborough	The Island Farmers' Progress Association	H. Simpson, junr.		
Maryborough	Wide Bay and Burnett Agricultural and Horticultural Society	A. H. Jones ...	22, 23, and 24 May	24, 25, and 26 June
Miriam Vale	Miriam Vale Farmers' Association	J. Spencer ...		
Montville ...	Montville Fruitgrowers and Farmers' Progress Association	C. J. Wyer ...		

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Show Dates.	
			1907.	1908.
Mooloolah ...	Mooloolah Farmers and Fruitgrowers' Progress Association	G. S. Skerman ...		
Mosman ...	Mosman District Agricultural Society	G. W. Muntz ...		
Mount Cotton	Mount Cotton and Redland Bay Fruitgrowers and Farmers' Association	W. E. Burns ...		
Mount Mee...	Mount Mee Farmers' Association ...	Jas. H. Robinson ...		
Mount Morgan	Mount Morgan Agricultural, Pastoral, and Poultry Society	J. S. Lyle ...		
Mount Ubi, Eumundi	The Kenilworth Farmers' Association	H. Pickering ...		
Nambour ...	Dulong and Kureelpa Farmers and Canegrowers' Association	A. A. Petrie ...		
Nambour ...	Obi Obi Farmers and Dairyemen's Progressive Association	H. Robinson ...		
Nanango ...	Nanango Agricultural, Pastoral, and Mineral Society	J. W. Sigley ...	25 and 26 April	
Nanango ...	North Barker's Creek Farmers' Association	A. Becker ...		
Nerang ...	Southern Queensland and Border Agricultural and Pastoral Association	H. J. Cooper ...	18 Oct.	
North Isis ...	North Isis Canegrowers' Association	T. E. Barnes ...		
North Pine ...	Moreton Agricultural, Horticultural, and Industrial Association	D. McQ. Fraser ...	...	15 July
Oakey, <i>viâ</i> Eumundi	Kenilworth Farmers' Association ...	Thos. H. Gordon...		
Oakey ...	Oakey Agricultural and Pastoral Society	E. R. Pace ...		
Palmwoods ...	Palmwoods Industrial Fruitgrowers' Progress Association	H. Taylor ...		
Peachester, <i>viâ</i> Beerwah, N.C. Line	The Peachester Progress Association	W. Vieritz ...		
Pittsworth ...	Pittsworth Pastoral, Agricultural, and Horticultural Association	John J. Daniel, senr.	30 Jan.	29 Jan.
Pomona ...	Pomona Agricultural and Progress Association	H. J. Scott ...		
Port Douglas	Port Douglas and Mosman Pastoral, Agricultural, Horticultural, and Mining Association	H. McMahon ...	August (Date not fixed)	
Proserpine ...	Preston Farmers and Settlers' Association	T. Duval ...		
Proserpine ...	Preston Farmers and Canegrowers' Association	R. C. Dagg ...		
Proserpine ...	Cannon Valley and District Farmers' Progress Association	W. A. Compton ...		
Roadvale ...	Roadvale Progress Association ...	Henry Clark ...		
Rockhampton	Alton Downs Farmers' Association...	G. T. Crook ...		
Rockhampton	Central Queensland Farmers and Selectors' Association	T. Whitely, Coowonga		
Rockhampton	Central Queensland Stockowners' Association	R. R. Dawbarn ...		
Rockhampton	Rockhampton Agricultural Society...	A. C. Lyons ...	20, 21, and 22 June	
Roma ...	Western Pastoral and Agricultural Association of Queensland	Angus McPherson	16 and 17 July	
Roma ...	Yingerbay Farmers' Association ...	R. Frederick ...		
Roma (Blythdale)	Waroby Farmers' Association ...	Geo. Munt... ..		
Roma ...	Euthulla Farmers and Fruitgrowers' Association	J. Bates ...		
Roma ...	The United Maranoa Farmers' Association	R. Frederick, senr.		
Rosewood ...	Farmers' Club	P. H. Adams ...	29 and 30 May	
Southport ...	Southport Horticultural Society ...	E. Fass ...		
Springure ...	Queensland Pastoral Society...	G. R. Milliken ...		
Stanthorpe ...	Border Pastoral, Agricultural, and Mining Society	Geo. Simcocks ...	21 and 22 Feb.	20 and 21 Feb.
St. George ...	Balonne Pastoral and Agricultural Society	T. M. Cummings ...	7 and 8 May	

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Show Dates.	
			1907.	1908.
Sydney ...	Royal Agricultural Society of New South Wales	...	7, 8, 9, and 10 Aug.	
Takura (Pialba line)	Takura Farmers' Progress Association	S. E. Tooth ...		
Teutoberg ...	Teutoberg Farmers' Progress Association	E. M. Nothling ...		
Tinana ...	Tinana Fruitgrowers and Farmers' Association	H. G. Habler ...		
Tingoora ...	Tingoora Farmers' Progress Association	Arthur Boisen ...	6, 7, 8, and 9 Aug.	
Toowoomba...	Royal Agricultural Society of Queensland	G. A. Leichney ...		
Townsville ...	Townsville Pastoral, Agricultural, and Industrial Association (formerly North Queensland Pastoral and Agricultural Association)	J. N. Parkes ...	2 and 3 July	
Upper Kedron	Upper Kedron Fruitgrowers and Farmers' Association	A. Marshall ... A. Pickering ...		
Wallumbilla	Wallumbilla Farmers' Association ...	A. Budd ...		
Warren Siding	The Stanwell United District Farmers' Union	G. N. Terry ...		
Warwick ...	Eastern Downs Horticultural and Agricultural Association	F. H. Selke ...	12, 13, and 14 Feb.	
Wellington Point	Wellington Point Agricultural, Horticultural, and Industrial Association	Victor Drury ...	18 Sept.	
West Haldon, <i>viâ</i> Greenmount	West Haldon Farmers' Progress Association	A. E. Ayris ...		
Wondai ..	Mondure Farmers' Progress Association	S. R. Monteith ...		
Woolloom-gabba	Queensland Dairy Herdbook Society	Alfred Gorrie ...		
Woombye ...	Maroochy Pastoral, Agricultural, Horticultural, and Industrial Society	P. S. Hungerford...	...	15 and 16 July
Woombye ...	Woombye Fruitgrowers' and Progress Association	E. E. McNall ...		
Wooroolin ...	Wooroolin Farmers' Progress Association	A. Deighton ...		
Wooroolin (Memerambi Siding)	Memerambi Farmers' Progress Association	J. E. Reid ...		
Yandina ...	Yandina Agricultural and Progress Association	W. R. Brayden ...		
Yingerbay ...	United Farmers' Association of the Maranoa	R. Frederich ...		
Zillmere ...	Zillmere Horticultural Society ...	E. H. Decker ...		

Societies and associations desirous of being registered and placed on the above list must make application to that effect, and forward to the Under Secretary for Agriculture and Stock the following particulars:—

Number of members who have paid their subscriptions for 1907.

Number of meetings held by the Society during 1907.

Date of the last meeting.

Name of the Secretary for 1908.

Departmental Announcements.

The EDITOR will be glad to receive any papers of special merit which may be read at meetings of Agricultural and Pastoral Associations in Queensland, reserving, however, the right to decide whether their value and importance will justify their publication.

Secretaries of Associations are requested to be good enough to forward to the EDITOR, as early as possible, the dates of forthcoming Shows, as it is important in the interests of the Associations that these dates should be published.

To enable recipients of the *Queensland Agricultural Journal* to have the half-yearly volume bound, covers in boards and cloth will be supplied from this office on application to the Under Secretary for Agriculture and Stock. Applications must be accompanied by a remittance of SIXPENCE to cover cost. For the convenience of those who are not within reach of a bookbinder, a Special Cover has been designed, which obviates the necessity for binding. These covers will be supplied at ONE SHILLING each.

In order to avoid disappointment, correspondents who wish for replies to questions in the *Journal* are requested to note that it is imperative that all matter for publication on the first day of any month should reach the Editor by the 15th of the previous month.

For the information of those who are desirous of communicating with the managers of State farms, we give their names and addresses below:—Queensland Agricultural College, Gatton, principal, J. Mahon; Westbrook State Farm, Westbrook, manager, C. Ross; Biggenden State Farm, Biggenden, manager, D. Macpherson; Hermitage State Farm, Warwick, manager, John Liverseed; Gindie State Farm, manager, R. Jarrott; Kamerunga State Nursery, Cairns, manager, Howard Newport; Roma State Farm, manager, R. Soutter; Botanic Gardens, director, J. F. Bailey.

It is notified, for the information of intending Visitors to the Queensland Agricultural College, that the Second Wednesday in each month has been set apart for the reception of Parties of Farmers and others desirous of inspecting the Institution. Supplies of hot water and milk can be obtained at the College, if desired.

IMPORTATION OF PLANTS, FRUIT, SEEDS, ETC., INTO CAPE COLONY.

The Department of Agriculture and Stock has received from the Acting Prime Minister of the Commonwealth a copy of a Proclamation issued by the Governor in Council of Cape Colony, embodying revised regulations with regard to the introduction of plants, trees, fruit, seeds, roots, &c., into that colony from overseas, by which such introduction of eucalyptus, acacia, coniferous trees, and certain stone fruits is prohibited. Those interested in the export of such plants may obtain all information on the subject from the Department of Agriculture and Stock, Brisbane.

QUEENSLAND AGRICULTURAL COLLEGE.

FOR SALE.

PURE-BRED PIGS, all from imported stock, including Berkshire and Large and Middle Yorkshires. BOARS, 2 GUINEAS; SOWS, 1 GUINEA each; f.o.b. Gatton.

Poultry of the following breeds:—Brown Leghorns, Silver-grey Dorkings, Old English Spangled Game, Plymouth Rocks, Minorcas, White Wyandottes, Silver-laced Wyandottes, Black Orpingtons, Buff Orpingtons, White Leghorns. Prices, from 10s. each, f.o.b. Gatton.

Eggs of the above breeds are available in the season—1st July to 31st December; and nine out of each setting are guaranteed fertile. Should less than nine prove to be fertile, the infertiles will be replaced if returned carriage paid. This rule will be strictly adhered to. Price, 10s. per setting, for all breeds, f.o.b. Gatton.

Applications for Setting of Eggs, accompanied by Remittance, may be made to the Principal, Queensland Agricultural College.

A few Settings of American Bronze-wing Turkey Eggs will be available at 15s. per setting, f.o.b. Gatton.

As it has been decided that all surplus stock is to be disposed of by auction sales to be held annually, no pure-bred bulls will be available for private sale.

The following Stud Animals are available for Service at the College Farm, at a charge of 10s. for pure-bred and 5s. for grade cows:—Imported Shorthorn, Jersey, Holstein, and Guernsey Bulls.

The following Bulls imported from Great Britain are also available for Service at a charge of 10s. for all cows:—

Ayrshire Bull, SPECULATION.

Shorthorn Bull, BURTON SPOT.

Sows may be served also by imported Berkshire, British Large Black, and Yorkshire Pigs, at a charge of 5s. for each service.

Paspalum Roots will be supplied to purchasers at 2s. 6d. per sack, f.o.b. Gatton. Applicants will be supplied on receipt of remittance to the amount of the order.

Small quantities of Roots of the following Grasses will also be available for disposal:—Rhodes Grass, Wonder Grass.

Seeds for Sale:—Cowpea, Sunflower, Sorghums, Panicum.

JOHN MAHON, Principal.

"THE QUEENSLAND FLORA"

By F. MANSON BAILEY, F.L.S.,

Colonial Botanist of Queensland.

WITH PLATES ILLUSTRATING SOME RARE SPECIES.

IN SIX PARTS, OF BETWEEN 300 AND 400 PAGES EACH, ROYAL OCTAVO.

Price, £1 10s. for Complete Work.

Obtainable at the DEPARTMENT of AGRICULTURE and STOCK.

"QUEENSLAND GOVERNMENT MINING JOURNAL,"

PUBLISHED MONTHLY,

(Under the Authority of the Mines Department),

And contains the most Authentic Information pertaining to Mining Matters
in Queensland.

Publishers: GORDON & GOTCH, Queen street, Brisbane, and 15
St. Bride street, Ludgate Circus, London, E.C.

Copies can likewise be obtained from Booksellers on the Mining Fields of
the State and in the Australasian Capitals. Also, from the

QUEENSLAND GOVERNMENT OFFICE,

Westminster Chambers, Victoria street, London, S.W.

QUEENSLAND AGRICULTURAL COLLEGE.

The College, which is situated within 4 miles of Gatton and 1 mile from the College Railway Siding, comprises 1,692 acres, and the buildings can accommodate 60 Students.

TERMS.

TWENTY-SEVEN POUNDS per annum, paid half-yearly in advance. Students are also charged One Pound per annum each for medical attendance, the sports fund, and for guarantee fee.

The course of instruction includes PRACTICAL AGRICULTURE in all its branches, DAIRYING, GARDENING, STOCK-BREEDING, and MECHANICAL ARTS. Classes are also held daily for THEORETICAL INSTRUCTION in these branches, as well as in SURVEYING, CHEMISTRY, &c.

The College Calendar, giving full particulars, may be obtained on application to the Principal at the College, or to the Under Secretary for Agriculture and Stock, Brisbane.

BURSARIES.

Four bursaries are given annually. An examination for these is held in June or July of each year. Bursaries will be awarded upon the following conditions:—Candidates (males) to be from sixteen to eighteen years of age, of sound constitution, and in good health; they must have resided in the State for the two years immediately preceding the time of their examination for such bursary, or their parents must have resided in the State three years immediately preceding such examination. The bursar is entitled—subject to good behaviour and the pleasure of Parliament—to free board and instruction as a resident student for a period of three years. He is required to take up his residence at the College within one month of the publication of the results of the examination; otherwise he forfeits his right to a bursary.

The AGE of CANDIDATES for Admission to the College as Students is Sixteen Years.

MERMITAGE STATE FARM.

FOR SALE.

PURE-BRED MIDDLE YORKSHIRE BOARS (Progeny of Imported Stock), £2 2s. each on rail at Hermitage.

TURKEY GOBBLERS, 11 months old, THIRTY SHILLINGS each on rail at Hermitage.

FOR SERVICE—

Middle Yorkshire Boar, HOLYWELL CHUB (Imported)

Berkshire Boar, YOUNG BOOMERANG (Imported).

Full particulars on application to THE MANAGER, State Farm, Hermitage.

STATE FARM, WESTBROOK.

CANARY GRASS

(*Phalaris commutata*).

This is the best all-the-year-round grass as yet introduced for Green Cutting, Hay, or Feeding-off. Planting should be done during the Winter and Early Spring, before hot dry weather sets in. It is particularly luxuriant in winter, and behaves remarkably well during the hot dry months. The Manager believes it will flourish in any part of the Commonwealth.

Rootlings: Two SHILLINGS AND SIXPENCE per Dozen, or TWELVE SHILLINGS per 100.

To expedite delivery, application should be made direct to the MANAGER, Westbrook State Farm, together with remittance to cover the cost of Rootlets and Freight.

STATE SCHOOLS will be supplied with Small Parcels of Rootlings of the above FREE OF CHARGE.

Applications, however, must include cost of freight.

POULTRY.

GOLDEN WYANDOTTE COCKERELS, from Heavy Laying Strains, FOR SALE. Price: SEVEN SHILLINGS AND SIXPENCE each. Apply to
THE MANAGER.

PURCHASE OF STOCK AND PRODUCE FROM THE DEPARTMENT OF AGRICULTURE

Purchasers of Stock and Produce, Plants, Seed, &c., from the State Farms and Agricultural College are reminded that Sales from these Institutions are made for Cash only. Persons desirous of making purchases should, therefore, first ascertain the cost of whatever articles they desire to obtain, and remit the full purchase-money when sending an order.

COTTON SEED.

We have been requested to notify Cotton Planters that Messrs. J. KITCHEN AND SONS, Limited, are prepared to supply UPLAND COTTON SEED FREE for this year's planting, and that the firm will pay the railage on all Cotton consigned to them during this year and 1907. The railage which has been already charged to Cotton Suppliers will be refunded to those who have sent in supplies.

STATE NURSERY, KAMERUNGA, CAIRNS.

RUBBER, COCOA, KOLA-NUT, CAROB BEAN, KAPOCK, VANILLA, CARDAMOM, BREADFRUIT, DIVI-DIVI, GINGER, AND OTHER VALUABLE TROPICAL ECONOMIC PLANTS FOR SALE, AT NOMINAL RATES, TO SETTLERS AND FARMERS.

The Instructor in Tropical Agriculture notifies that PLANTS or SEEDS of the above useful and valuable AUXILIARY PRODUCTS may be obtained by application to the Manager, Kamerunga State Nursery. PLANTS available at any time. SEEDS when in season, BEING MOSTLY OF SHORT VITALITY, should be promptly applied for.

RUBBERS, KAPOCK, CARDAMOM, and especially rare Plants, or Seedlings difficult to raise, 1s. each, or 10s. per dozen; others, 6d. each, or 5s. per dozen. Seed, 6d. per packet. Plus packing, railage, or postage.

Remittances should accompany applications.

Lists of Tropical Economic Plants available may be obtained on application to the Manager, Kamerunga State Nursery, Cairns, North Queensland.

RUBBER SEEDS AND PLANTS.

Variety and Name.	Plants or Seed.	When Available.	Price.
Rambong or Assam (<i>Ficus elastica</i>)	Plants only	Any time ...	1s. each, 10s. per doz.
Para Rubber (<i>Hevea brasiliensis</i>)	Plants ...	„ „ ...	„ „ „
„ „ „ „	Seed ...	Feb. to April	1s. per oz. (about 1 doz.)
Central American (<i>Castilloa elastica</i>)	Plants ...	Any time ...	1s. each, 10s. per doz.
„ „ „ „	Seed ...	Nov. to Jan.	1s. per oz. (about 100)
Iré or Logos Rubber (<i>Funtumia elastica</i>)	Plants only	Any time ...	1s. each, 12s. per doz.
Ceara Rubber (<i>Manihot Glaziovii</i>)	Seed only	, , ...	1s. per oz. (about 50)
West African Rubber (<i>Taberncemontana</i>)	Plants ...	„ „ ...	1s. each, 10s. per doz.
„ „ „ (<i>Crassa</i>)	Seed ...	„ „ ...	1s. per oz. (about 100)

Above prices are for delivery on the Nursery. If applicants wish Plants or Seed sent, packing, postages, railage to port, &c., are extra. Seed and small quantities of Plants may be sent by parcels post at purchaser's risk. Plants, being delicate, do not travel well by post.

Hessian-covered cases, holding one to three dozen, cost 4s. 6d. extra f.o.b. Cairns, whence they will be shipped "freight on." The demand for Seed being large and the supply limited, Orders received, with remittance, will be booked and completed as soon as Seed is available.

NOTICE OF SHOW DATES.

We wish to draw the attention of Secretaries of Agricultural and Pastoral Societies and Associations to the importance of promptly notifying the Editor of any change in the dates on which shows are to be held. A case occurred in June last, in which the date of a certain society's show was set down in this Journal and in the daily metropolitan papers as the 4th and 5th June. An officer of this Department was just about to leave Brisbane to attend the show as a judge when, on his way to the steamer, he fortunately met another judge, who informed him that the show had been postponed until the 11th June. Had due notice of the change been sent to us, this would not have occurred. Had the officer in question left by the boat, he would have been unable to leave the town in the North for a week, and all his engagements in various districts would have had to be cancelled.

IMPORTS OF FRUIT, ETC., INTO VICTORIA.

The following Regulations relating to the importation of fruit, plants, trees, &c., into the State of Victoria have been promulgated by the Victorian Minister for Agriculture:—

1. Inspectors are authorised and required to charge the following fees and expenses for examining citrus fruits imported, introduced, or brought into Victoria:—

For each case or package not exceeding one bushel in capacity, One halfpenny.

The inspection fee for bananas is now 1d. per bunch or case.

For each case or package exceeding one bushel in capacity, One penny.

2. Such fees and expenses shall be paid by the owner or the person in possession to the inspector.

CLEARING LAND.

TREWHELLA BROS.' PATENT JACKS ARE
UNSURPASSED FOR THIS WORK.

THE MONKEY JACK

Is Specially Designed for
Heavier Stump-grubbing
and Tree-extracting.



THE WALLABY JACK

Is Specially Designed for
Lighter Stump-grubbing
and Tree-extracting.

GIVES ONE MAN MORE THAN THE POWER OF TEN
SAVES ITS COST EASILY WITHIN THREE MONTHS.

Inquire Particulars of Leading Ironmongers and Storekeepers; or Send for Catalogues to

A. ROBINSON,
55 ADELAIDE STREET, BRISBANE.—(Queensland Depot.)

LIST OF AGRICULTURAL, HORTICULTURAL, AND PASTORAL SOCIETIES AND ASSOCIATIONS IN QUEENSLAND.

Postal Address.	Name of Society.	Name of Secretary.	Show Dates.	
			1907.	1908.
Allora ...	Central Downs Agricultural and Horticultural Association	J. H. Buxton ...	7 Feb.	11 and 12 Feb.
Allora ...	The Allora Farmers' Progress Association	P. Donovan ...		
Amby ...	Amby Farmers' Association ...	W. Jas. Sullivan ...		
Atherton ...	Barron Valley Agricultural, Pastoral, and Industrial Association	G. Bardon ...	24 and 25 July	
Atherton ...	The Atherton District Farmers' Association	Fredk. Stewart ...		
Ayr ...	Lower Burdekin Farmers' Association	G. S. Mackersie ...		
Ayr ...	Lower Burdekin Pastoral, Agricultural, and Industrial Association	I. A. Holmes ...		
Beaudesert ...	Logan and Albert Pastoral and Agricultural Society	A. Winship ...	1 May	
Beenleigh ...	Agricultural and Pastoral Society of Southern Queensland	Wilson Holliday ...	20 Sept.	3 and 4 Sept.
Beenleigh ...	Logan Farming and Industrial Association	Wm. G. Winnett, Loganlea		
Biggenden ...	Biggenden Agricultural and Pastoral Society	C. J. Stephensen ...	24 and 25 July	9 and 10 July
Blackall ...	Barcoo Pastoral Society ...	...	28 and 29 May	
Blackbutt ...	Farmers' Progress Association ...	John Dreghorn ...		
Boonah ...	Fassifern and Dugandan Agricultural and Pastoral Association	C. E. Mackenzie ...	27 and 28 June	13 and 14 May
Booyal ...	Booyal Farmers' Progress Association	N. Rosenlund ...		
Bowen ...	Pastoral, Agricultural, and Mining Association	A. W. Kirke ...		
Bowen ...	Proserpine Farmers and Settlers' Association	J. Cooper ...		
Bowen(Proserpine) ...	Cannon Valley Farmers and Settlers' Association	J. H. Ryan ...		
Bowen ...	Bowen Farmers and Fruitgrowers' Association	H. C. Smethurst ...		
Brisbane ...	Horticultural Society of Queensland	F. W. Woodruffe ...		
Brisbane ...	Queensland Acclimatisation Society	H. J. Johnson ...		
Brisbane ...	National Agricultural and Industrial Association of Queensland	Charles A. Arvier	13, 14, 15, 16, and 17 Aug.	10, 11, 12, 13, 14, & 15 Aug.
Brisbane ...	United Pastoralists' Association ...	Fredk. Ranson ...		
Brisbane ...	Queensland Beekeepers' Association	F. Wilsdon Smith		
Brisbane ...	Queensland Chamber of Agriculture	F. W. Peek ...		
Brisbane ...	Queensland Citrus-growers' Association	R. M. Cooper ...		
Brisbane ...	Combined Moreton Association ...	Wm. Ewart ...		
Brookfield ...	The Brookfield and Pullen Vale Farmers, Dairymen, and Fruitgrowers' Association	W. R. Moon ...		
Buderim ...	Buderim Mountain Coffee and Fruit-growers' Association	G. O. Burnett ...		
Buderim Mt. ...	North Coast Central Association ...	James Lindsay ...		
Bundaberg ...	Bundaberg Horticultural and Industrial Society	H. E. Ashley ...		
Bundaberg ...	Council of Agriculture ...	H. J. Page ...		
Bundaberg ...	Bundaberg Agricultural, Pastoral, and Industrial Society	H. J. Page ...	29 and 30 May	
Bundaberg ...	Woongarra Canegrowers and Farmers' Association	Thos. W. Walker		
Burpengary ...	Burpengary Farmers' Association ...	F. W. Uhlmann ...		
Cairns ...	Aloombah Farmers' Association ...	N. P. Petersen ...		
Cairns ...	Cairns Agricultural, Pastoral, and Mining Association	J. Reid ...	5 and 6 Sept.	
Cairns ...	Cairns District Coffee-growers' Association	L. Battinson ...		
Cairns ...	Cairns District United Farmers' Association	Wm. Griffin ...		
Cairns ...	Hambledon Planters' Association ...	A. W. Hawkins ...		
Cardwell ...	Rockingham Progress Association ...	T. E. Fitzsimmons		

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Show Dates.	
			1907.	1908.
Cawdor ...	Highfields and Cawdor Farmers' Association	H. Franken ...		
Cedar Pocket, <i>via</i> Gympie	Cedar Pocket Farmers' Progress Association	Samuel Ericksen ...		
Charleville ...	Central Warrego Pastoral and Agricultural Association	G. M. Bell ...	14 and 15 May	
Charters Towers	Towers Pastoral, Agricultural, and Mining Association	A. H. Pritchard ...	18 and 19 June	
Childers ...	Isis Agricultural Association ...	H. Epps ...		
Childers ...	Doolbi Mill Branch, Isis Agricultural Association	R. S. Rankin ...		
Childers ...	Childers Mill Branch, Isis Agricultural Association	H. Epps ...		
Childers ...	Childers Pastoral, Agricultural, and Industrial Society	A. Eastaughffe ...	12, 13, and 14 June	
Childers ...	The Childers Mill Canegrowers' Association	A. Eastaughffe ...		
Clermont ...	Peak Downs Pastoral, Horticultural, and Agricultural Society	F. Leysley ...		
Cleveland ...	Cleveland Horticultural Society ...	Miles R. Fox ...	31 Aug.	
Clifton ...	Darling Downs Pastoral, Agricultural, and Industrial Association	S. J. B. Just ...		
Columboola ...	The Columboola Farmers and Settlers' Association	Geo. T. Sutton ...		
Coochin ...	The Coochin Farmers' Progress Association	J. T. W. McLaughlin		
Cooyar ...	Yeraman Creek Farmers' Progress Association	M. Harland ...		
Cooran ...	Cooran Progress and Agricultural Association	A. G. Bosanquet ...		
Crow's Nest	The Crow's Nest Agricultural and Horticultural Society	James Gleeson ...		
Croydon ...	The Gulf Mining, Pastoral, and Industrial Association	V. Creagh ...		
Cunnamulla	South Warrego Pastoral Association	J. Winward ...		
Dalby ...	Northern Downs Pastoral and Agricultural Association	E. Watt ...		
Dallarnil Scrub, <i>via</i> Degilbo	Dallarnil Farmers and Dairymen's Progress Association	Vincent H. Jones		
Dallarnil ...	The Dallarnil and Woowoonga Sugar-growers' Association	John C. Robertson		
Dundowran, <i>via</i> Maryborough	Dundowran and Takura Settlers' Association	H. J. E. Tooth ...		
Esk ...	Esk Agricultural, Pastoral, and Industrial Society	J. G. Smith ...	30 April	26 May
Eudlo ...	Eudlo Farmers and Fruitgrowers' Progress Association	Walter T. Jeremy		
Flagstone Ck., <i>via</i> Helidon	Flagstone Creek Farmers' Progress Association	James Scanlan ...		
Forest Hill ...	Forest Hill Agricultural and Progress Association	Wm. Jones ...		
Gayndah ...	Gayndah Pastoral, Industrial, Agricultural, and Horticultural Association	Thomas McMahon	25 and 26 June	
Gayndah ...	Reid's Creek Farmers' Progress Association	George Sutherland		
Geraldton ...	Johnstone River Sugar-growers and Manufacturers' Association	W. Stevenson ...		
Gin Gin ...	Currajong and Gin Gin Agricultural and Pastoral Society	J. R. Hamilton ...	15 June	3 June
Gladstone ...	Gladstone Pastoral and Agricultural Association	W. J. Manning ...		
Gladstone ...	Port Curtis Agricultural, Pastoral, and Mining Association	J. T. W. Brown ...		
Gooburrum, Bundaberg	Gooburrum Farmers and Canegrowers' Association	W. J. Tutin ...		
Goombungee	Goombungee Farmers' Association ...	Thos. Smith ...	23 Jan.	
Goondiwindi	MacIntyre River Pastoral and Agricultural Society	E. T. Drake ...	3 and 4 April	
Gracemere ...	The Gracemere District Farmers and Progress Association	Arthur E. Fisher ...		
Gympie ...	Agricultural, Mining, and Pastoral Society	F. Vaughan ...	21 and 22 Aug.	

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Show Dates.	
			1907.	1908.
Gympie ...	Chatsworth Farmers' Progress Association	W. Allen ...		
Gympie ...	Gympie Horticultural Society ...	Charles Brasch ...		
Gympie ...	Woondum and Brisbane Road Farmers' Progress Association	J. Mullaly ...		
Harrisville ...	Harrisville Farmers' Progress Association	W. J. Burnett ...		
Hatton Vale	Hatton Vale Farmers' Progress Association	P. Sharry, junr. ...		
Headington Hill	Queensland Farmers' Association ...	J. E. Stehn ...		
Helidon ...	Helidon Scrub Farmers' Progress Association	James Sweeney ...		
Helidon ...	Monkey Creek Farmers' Progress Association, Withcott, Helidon	Thomas Turner ...		
Hendra ...	Nundah Agricultural, Horticultural, and Industrial Association	Geo. A. Patullo ...		
Herbert River	Halifax Planters' Club ...	A. Campbell ...		
Herbert River	Macknade Farmers' Association ...	Edwin S. Waller ...		
Herbert River	Fairford Farmers' Association ...	D. G. Scott ...		
Herbert River	United Farmers' Association ...	D. G. Scott ...		
Herberton ...	Mining, Pastoral, and Agricultural Association	John M. Hollway	1 April	
Hodgson ...	Hodgson and Dargal Farmers' Association	I. Stevenson ...		
Hopetoun ...	Hopetoun Pastoral, Agricultural, and Progressive Association	John Walsh ...		
Hughenden...	Hughenden Pastoral and Agricultural Association	H. G. McLean ...		
Ingham ...	Herbert River Pastoral and Agricultural Association (Agricultural Show)	P. J. Cochrane ...		
Ingham ...	Stone River Farmers' Association ...	W. B. G. Johnson		
Ipswich ...	Ipswich and West Moreton Agricultural and Horticultural Society	P. W. Cameron ...	17 Oct.	
Ipswich ...	Queensland Pastoral and Agricultural Society	J. McGill ...	19, 20, and 21 June	
Ipswich ...	The Amberley Farmers' Progress Association	Clark T. Seymour...		
Kelsey Creek via Bowen	Kelsey Creek Farmers' Progress Association	A. Fontaine ...		
Kolan, North	Kolan Canegrowers and Farmers' Association	Jas. H. Hendy ...		
Kilkivan ...	Kilkivan District Farmers and Settlers' Progress Association	M. Bambling ...		
Kingaroy ...	Kingaroy Farmer's Association ...	C. H. Hooper ...		
Kingaroy ...	South Burnett Agricultural, Pastoral, and Industrial Society	...	29 and 30 Aug.	10 and 11 June
Laidley ...	Lockyer Agricultural and Industrial Society (at Gatton)	W. A. McIlwraith		
Lakeside ...	Mungore Farmers' Association ...	C. C. Ridley ...		
Longreach ...	Longreach Pastoral and Agricultural Society	J. P. Peterson ...	6 and 7 May	
Lowood ...	The Lowood and Tarampa Pastoral and Agricultural Association	D. E. C. Kroger ...	Sept.	24 June
Ma Ma Creek, via Grantham	Ma Ma Creek Farmers' Progress Association	A. McKenzie ...		
Mackay ...	Agricultural, Pastoral, and Mining Association	F. Black ...		
Mackay ...	Pioneer River Farmers and Graziers' Association	J. P. Moule ...	4 and 5 June	
Mapleton ...	Fruitgrowers and Farmers' Progressive Association	W. J. Smith ...		
Mareeba ...	Mareeba Mining, Pastoral, and Agricultural Association	F. Cruckshank ...	3 and 4 June	
Maryborough	Maryborough Horticultural Society...	A. H. Jones ...		
Maryborough	The Island Farmers' Progress Association	H. Simpson, junr.		
Maryborough	Wide Bay and Burnett Agricultural and Horticultural Society	A. H. Jones ...	22, 23, and 24 May	24, 25, and 26 June
Miriam Vale	Miriam Vale Farmers' Association	J. Spencer ...		
Montville ...	Montville Fruitgrowers and Farmers' Progress Association	C. J. Wyer ...		

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Show Dates.	
			1907.	1908.
Mooloolah ...	Mooloolah Farmers and Fruitgrowers' Progress Association	G. S. Skerman ...		
Mosman ...	Mosman District Agricultural Society	G. W. Muntz ...		
Mount Cotton	Mount Cotton and Redland Bay Fruitgrowers and Farmers' Association	W. E. Burns ...		
Mount Mee...	Mount Mee Farmers' Association ...	Jas. H. Robinson ...		
Mount Morgan	Mount Morgan Agricultural, Pastoral, and Poultry Society	J. S. Lyle ...		
Mount Ubi, Eumundi	The Kenilworth Farmers' Association	H. Pickering ...		
Nambour ...	Dulong and Kureelpa Farmers and Canegrowers' Association	A. A. Petrie ...		
Nambour ...	Obi Obi Farmers and Dairymen's Progressive Association	H. Robinson ...		
Nanango ...	Nanango Agricultural, Pastoral, and Mineral Society	J. W. Sigley ...	25 and 26 April	
Nanango ...	North Barker's Creek Farmers' Association	A. Becker ...		
Nerang ...	Southern Queensland and Border Agricultural and Pastoral Association	H. J. Cooper ...	18 Oct.	
North Isis ...	North Isis Canegrowers' Association	T. E. Barnes ...		
North Pine ...	Moreton Agricultural, Horticultural, and Industrial Association	D. McQ. Fraser ...	...	15 July
Oakey, <i>viâ</i> Eumundi	Kenilworth Farmers' Association ...	Thos. H. Gordon ...		
Oakey ...	Oakey Agricultural and Pastoral Society	E. R. Pace ...		
Palmwoods ...	Palmwoods Industrial Fruitgrowers' Progress Association	H. Taylor ...		
Peachester, <i>viâ</i> Beerwah, N.C. Line	The Peachester Progress Association	W. Vieritz ...		
Pittsworth ...	Pittsworth Pastoral, Agricultural, and Horticultural Association	John J. Daniel, senr.	30 Jan.	29 Jan.
Pomona ...	Pomona Agricultural and Progress Association	H. J. Scott ...		
Port Douglas	Port Douglas and Mosman Pastoral, Agricultural, Horticultural, and Mining Association	H. McMahon ...	August (Date not fixed)	
Proserpine ...	Preston Farmers and Settlers' Association	T. Duval ...		
Proserpine ...	Preston Farmers and Canegrowers' Association	R. C. Dagg ...		
Proserpine ...	Cannon Valley and District Farmers' Progress Association	W. A. Compton ...		
Roadvale ...	Roadvale Progress Association ...	Henry Clark ...		
Rockhampton	Alton Downs Farmers' Association...	G. T. Crook ...		
Rockhampton	Central Queensland Farmers and Selectors' Association	T. Whitely, Coowonga		
Rockhampton	Central Queensland Stockowners' Association	R. R. Dawbarn ...		
Rockhampton	Rockhampton Agricultural Society...	A. C. Lyons ...	20, 21, and 22 June	11, 12, and 13 June
Roma ...	Western Pastoral and Agricultural Association of Queensland	Angus McPherson	16 and 17 July	
Roma ...	Yingerbay Farmers' Association ...	R. Frederick ...		
Roma (Blythdale)	Warooby Farmers' Association ...	Geo. Munt...		
Roma ...	Euthulla Farmers and Fruitgrowers' Association	J. Bates ...		
Roma ...	The United Maranoa Farmers' Association	R. Frederick, senr.		
Rosewood ...	Farmers' Club ...	P. H. Adams ...	29 and 30 May	
Southport ...	Southport Horticultural Society ...	E. Fass ...		
Springsure ...	Queensland Pastoral Society...	G. R. Milliken ...		
Springsure ...	The Springsure Pastoral and Agricultural Society	H. E. Laver ...	...	30 April
Stanthorpe ...	Border Pastoral, Agricultural, and Mining Society	Geo. Simcocks ...	21 and 22 Feb.	20 and 21 Feb.

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Show Dates.	
			1907.	1908.
St. George ...	Balonne Pastoral and Agricultural Society	T. M. Cummings ...	7 and 8 May	
Sydney ...	Royal Agricultural Society of New South Wales	...	7, 8, 9, and 10 Aug.	
Takura (Pialba line)	Takura Farmers' Progress Association	S. E. Tooth ...		
Teutoberg ...	Teutoberg Farmers' Progress Association	E. M. Nothling ...		
Tinana ...	Tinana Fruitgrowers and Farmers' Association	H. G. Habler ...		
Tingoora ...	Tingoora Farmers' Progress Association	Arthur Boisen ...	6, 7, 8, and 9 Aug.	
Toowoomba...	Royal Agricultural Society of Queensland	G. A. Leichney ...		
Townsville ...	Townsville Pastoral, Agricultural, and Industrial Association (formerly North Queensland Pastoral and Agricultural Association)	J. N. Parkes ...	2 and 3 July	
Upper Kedron	Upper Kedron Fruitgrowers and Farmers' Association	A. Marshall ... A. Pickering ...		
Wallumbilla	Wallumbilla Farmers' Association ...	A. Budd ...		
Warren Siding	The Stanwell United District Farmers' Union	G. N. Terry ...		
Warwick ...	Eastern Downs Horticultural and Agricultural Association	F. H. Selke ...	12, 13, and 14 Feb.	
Wellington Point	Wellington Point Agricultural, Horticultural, and Industrial Association	Victor Drury ...	18 Sept.	
West Haldon, <i>via</i> Greenmount	West Haldon Farmers' Progress Association	A. E. Ayris ...		
Wondai ..	Mondure Farmers' Progress Association	S. R. Monteith ...		
Woolloom-gabba	Queensland Dairy Herdbook Society	Alfred Gorrie ...		
Woombye ...	Maroochy Pastoral, Agricultural, Horticultural, and Industrial Society	P. S. Hungerford...	...	15 and 16 July
Woombye ...	Woombye Fruitgrowers' and Progress Association	E. E. McNall ...		
Wooroolin ...	Wooroolin Farmers' Progress Association	A. Deighton ...		
Wooroolin (Memerambi Siding)	Memerambi Farmers' Progress Association	J. E. Reid ...		
Yandina ...	Yandina Agricultural and Progress Association	W. R. Brayden ...		
Yingerbay ...	United Farmers' Association of the Maranoa	R. Frederich ...		
Zillmere ...	Zillmere Horticultural Society ...	E. H. Decker ...		

Societies and associations desirous of being registered and placed on the above list must make application to that effect, and forward to the Under Secretary for Agriculture and Stock the following particulars:—

Number of members who have paid their subscriptions for 1907.

Number of meetings held by the Society during 1907.

Date of the last meeting.

Name of the Secretary for 1908.

Departmental Announcements.

The EDITOR will be glad to receive any papers of special merit which may be read at meetings of Agricultural and Pastoral Associations in Queensland, reserving, however, the right to decide whether their value and importance will justify their publication.

Secretaries of Associations are requested to be good enough to forward to the EDITOR, as early as possible, the dates of forthcoming Shows, as it is important in the interests of the Associations that these dates should be published.

To enable recipients of the *Queensland Agricultural Journal* to have the half-yearly volume bound, covers in boards and cloth will be supplied from this office on application to the Under Secretary for Agriculture and Stock. Applications must be accompanied by a remittance of SIXPENCE to cover cost. For the convenience of those who are not within reach of a bookbinder, a Special Cover has been designed, which obviates the necessity for binding. These covers will be supplied at ONE SHILLING each.

In order to avoid disappointment, correspondents who wish for replies to questions in the *Journal* are requested to note that it is imperative that all matter for publication on the first day of any month should reach the Editor by the 15th of the previous month.

For the information of those who are desirous of communicating with the managers of State farms, we give their names and addresses below:—Queensland Agricultural College, Gatton, principal, J. Mahon; Westbrook State Farm, Westbrook, manager, C. Ross; Biggenden State Farm, Biggenden, manager, D. Macpherson; Hermitage State Farm, Warwick, manager, John Liverseed; Gindie State Farm, manager, R. Jarrott; Kamerunga State Nursery, Cairns, manager, Howard Newport; Roma State Farm, manager, R. Soutter; Botanic Gardens, director, J. F. Bailey.

It is notified, for the information of intending Visitors to the Queensland Agricultural College, that the Second Wednesday in each month has been set apart for the reception of Parties of Farmers and others desirous of inspecting the Institution. Supplies of hot water and milk can be obtained at the College, if desired.

NOTICE OF SHOW DATES.

We wish to draw the attention of Secretaries of Agricultural and Pastoral Societies and Associations to the importance of promptly notifying the Editor of any change in the dates on which shows are to be held. A case occurred in June last, in which the date of a certain society's show was set down in this *Journal* and in the daily metropolitan papers as the 4th and 5th June. An officer of this Department was just about to leave Brisbane to attend the show as a judge when, on his way to the steamer, he fortunately met another judge, who informed him that the show had been postponed until the 11th June. Had due notice of the change been sent to us, this would not have occurred. Had the officer in question left by the boat, he would have been unable to leave the town in the North for a week, and all his engagements in various districts would have had to be cancelled.

IMPORTATION OF PLANTS, FRUIT, SEEDS, ETC., INTO CAPE COLONY.

The Department of Agriculture and Stock has received from the Acting Prime Minister of the Commonwealth a copy of a Proclamation issued by the Governor in Council of Cape Colony, embodying revised regulations with regard to the introduction of plants, trees, fruit, seeds, roots, &c., into that colony from oversea, by which such introduction of eucalyptus, acacia, coniferous trees, and certain stone fruits is prohibited. Those interested in the export of such plants may obtain all information on the subject from the Department of Agriculture and Stock, Brisbane.

QUEENSLAND AGRICULTURAL COLLEGE.

FOR SALE.

PURE-BRED PIGS, all from imported stock, including Berkshire and Large and Middle Yorkshires. BOARS, 2 GUINEAS; SOWS, 1 GUINEA each; f.o.b. Gatton.

Poultry of the following breeds:—Brown Leghorns, Silver-grey Dorkings, Old English Spangled Game, Plymouth Rocks, Minorcas, White Wyandottes, Silver-laced Wyandottes, Black Orpingtons, Buff Orpingtons, White Leghorns. Prices, from 10s. each, f.o.b. Gatton.

Eggs of the above breeds are available in the season—1st July to 31st December; and nine out of each setting are guaranteed fertile. Should less than nine prove to be fertile, the infertiles will be replaced if returned carriage paid. This rule will be strictly adhered to. Price, 10s. per setting, for all breeds, f.o.b. Gatton.

Applications for Setting of Eggs, accompanied by Remittance, may be made to the Principal, Queensland Agricultural College.

A few Settings of American Bronze-wing Turkey Eggs will be available at 15s. per setting, f.o.b. Gatton.

As it has been decided that all surplus stock is to be disposed of by auction sales to be held annually, no pure-bred bulls will be available for private sale.

The following Stud Animals are available for Service at the College Farm, at a charge of 10s. for pure-bred and 5s. for grade cows:—Imported Shorthorn, Jersey, Holstein, and Guernsey Bulls.

The following Bulls imported from Great Britain are also available for Service at a charge of 10s. for all cows:—

Ayrshire Bull, SPECULATION.

Shorthorn Bull, BURTON SPOT.

Sows may be served also by imported Berkshire, British Large Black, and Yorkshire Pigs, at a charge of 5s. for each service.

Paspalum Roots will be supplied to purchasers at 2s. 6d. per sack, f.o.b. Gatton. Applicants will be supplied on receipt of remittance to the amount of the order.

Small quantities of Roots of the following Grasses will also be available for disposal:—Rhodes Grass, Wonder Grass.

Seeds for Sale:—Cowpea, Sunflower, Sorghums, Panicum.

JOHN MAHON, Principal.

QUEENSLAND AGRICULTURAL COLLEGE.

The College, which is situated within 4 miles of Gatton and 1 mile from the College Railway Siding, comprises 1,692 acres, and the buildings can accommodate 60 Students.

TERMS.

TWENTY-SEVEN POUNDS per annum, paid half-yearly in advance. Students are also charged One Pound per annum each for medical attendance, the sports fund, and for guarantee fee.

The course of instruction includes PRACTICAL AGRICULTURE in all its branches, DAIRYING, GARDENING, STOCK-BREEDING, and MECHANICAL ARTS. Classes are also held daily for THEORETICAL INSTRUCTION in these branches, as well as in SURVEYING, CHEMISTRY, &c.

The College Calendar, giving full particulars, may be obtained on application to the Principal at the College, or to the Under Secretary for Agriculture and Stock, Brisbane.

BURSARIES.

Four bursaries are given annually. An examination for these is held in June or July of each year. Bursaries will be awarded upon the following conditions:—Candidates (males) to be from sixteen to eighteen years of age, of sound constitution, and in good health; they must have resided in the State for the two years immediately preceding the time of their examination for such bursary, or their parents must have resided in the State three years immediately preceding such examination. The bursar is entitled—subject to good behaviour and the pleasure of Parliament—to free board and instruction as a resident student for a period of three years. He is required to take up his residence at the College within one month of the publication of the results of the examination; otherwise he forfeits his right to a bursary.

The AGE of CANDIDATES for Admission to the College as Students is Sixteen Years.

HERMITAGE STATE FARM.

FOR SALE.

PURE-BRED MIDDLE YORKSHIRE BOARS (Progeny of Imported Stock), £2 2s. each on rail at Hermitage.

TURKEY GOBBLERS, 11 months old, THIRTY SHILLINGS each on rail at Hermitage.

FOR SERVICE—

Middle Yorkshire Boar, HOLYWELL CHUB (Imported)

Berkshire Boar, YOUNG BOOMERANG (Imported).

Full particulars on application to THE MANAGER, State Farm, Hermitage.

STATE FARM, WESTBROOK.

CANARY GRASS

(*Phalaris commutata*).

This is the best all-the-year-round grass as yet introduced for Green Cutting, Hay, or Feeding-off. Planting should be done during the Winter and Early Spring, before hot dry weather sets in. It is particularly luxuriant in winter, and behaves remarkably well during the hot dry months. The Manager believes it will flourish in any part of the Commonwealth.

Rootlings: Two SHILLINGS AND SIXPENCE per Dozen, or TWELVE SHILLINGS per 100.

Seed is now ready for distribution. Price, £1 1s. per lb., or 1s. and 2s. 6d. packet, Post Free.

To expedite delivery, application should be made direct to the MANAGER, Westbrook State Farm, together with remittance to cover the cost of Rootlets and Freight.

STATE SCHOOLS will be supplied with Small Parcels of Rootlings of the above FREE OF CHARGE.

Applications, however, must include cost of freight.

POULTRY.

GOLDEN WYANDOTTE COCKERELS, from Heavy Laying Strains, FOR SALE. Price: SEVEN SHILLINGS AND SIXPENCE each. Apply to
THE MANAGER.

PURCHASE OF STOCK AND PRODUCE FROM THE DEPARTMENT OF AGRICULTURE

Purchasers of Stock and Produce, Plants, Seed, &c., from the State Farms and Agricultural College are reminded that Sales from these Institutions are made for Cash only. Persons desirous of making purchases should, therefore, first ascertain the cost of whatever articles they desire to obtain, and remit the full purchase-money when sending an order.

IMPORTATION OF FRUIT OR PLANTS INTO NEW ZEALAND.

(Extract from the "New Zealand Gazette" of 27th February, 1908.)

By an Order in Council, gazetted on the 20th February, 1908, the New Zealand Government have revoked all previous Proclamations and Orders in Council, dated respectively from 6th July, 1897, to 22nd January, 1908, referring to the importations into New Zealand of grape vines—rooted and cuttings—fruit infested with Queensland fruit fly, scale-infested plants and fruit, or with apple scab or black spot, or potatoes infested with Irish blight, or potato moth.

The new regulations declare that the only ports of entry for fruit or plants are—for fruit only, Bluff; for fruit and plants, Auckland, Wellington, Christchurch, Dunedin. They also provide for the inspection of fruit on arrival at the above ports, and for fumigation or destruction of shipments unaccompanied by a certificate signed by the shipper, and another signed by an officer of the Department of Agriculture of the State where the fruit was grown, certifying that the fruit is clean and free from disease. Full particulars will be found by anyone interested in shipping fruit to New Zealand in the "New Zealand Gazette" of 27th February, 1908.

STATE NURSERY, KAMERUNGA, CAIRNS.

RUBBER, COCOA, KOLA-NUT, CAROB BEAN, KAPOCK, VANILLA, CARDAMOM, BREADFRUIT, DIVI-DIVI, GINGER, AND OTHER VALUABLE TROPICAL ECONOMIC PLANTS FOR SALE, AT NOMINAL RATES, TO SETTLERS AND FARMERS.

The Instructor in Tropical Agriculture notifies that PLANTS or SEEDS of the above useful and valuable AUXILIARY PRODUCTS may be obtained by application to the Manager, Kamerunga State Nursery. PLANTS available at any time. SEEDS when in season, BEING MOSTLY OF SHORT VITALITY, should be promptly applied for.

RUBBERS, KAPOCK, CARDAMOM, and especially rare Plants, or Seedlings difficult to raise, 1s. each, or 10s. per dozen; others, 6d. each, or 5s. per dozen. Seed, 6d. per packet. Plus packing, railage, or postage.

Remittances should accompany applications.

Lists of Tropical Economic Plants available may be obtained on application to the Manager, Kamerunga State Nursery, Cairns, North Queensland.

RUBBER SEEDS AND PLANTS.

Variety and Name.	Plants or Seed.	When Available.	Price.
Rambong or Assam (<i>Ficus elastica</i>)	Plants only	Any time ...	1s. each, 10s. per doz.
Para Rubber (<i>Hevea brasiliensis</i>) }	Plants ...	„ „ ...	3d. each
„ „ „ „ }	Seed ...	Feb. to April	1s. per oz. (about 1 doz.)
Central American (<i>Castilloa elastica</i>)	Plants ...	Any time ...	6d. each, 5s. per doz.
„ „ „ „	Seed ...	Nov. to Jan.	1s. per oz. (about 100)
Iré or Logos Rubber (<i>Funtumia elastica</i>)	Plants only	Any time ...	1s. each, 12s. per doz.
Ceara Rubber (<i>Manihot Glaziovii</i>)	Seed only	, , ...	1s. per oz. (about 50)
West African Rubber (<i>Tabernaemontana</i>)	Plants ...	„ „ ...	6d. each, 5s. per doz.
„ „ „ (<i>Crassa</i>)	Seed ...	„ „ ...	1s. per oz. (about 150)

Above prices are for delivery on the Nursery. If applicants wish Plants or Seed sent, packing, postages, railage to port, &c., are extra. Seed and small quantities of Plants may be sent by parcels post at purchaser's risk. Plants, being delicate, do not travel well by post.

Hessian-covered cases, holding one to three dozen, cost 4s. 6d. extra f.o.b. Cairns, whence they will be shipped "freight on." The demand for Seed being large and the supply limited, Orders received, with remittance, will be booked and completed as soon as Seed is available.

* Owing to the limited supply of plants and seed available at the Nursery, settlers requiring large numbers may, by special arrangement of the Department, import in quantity from Singapore or elsewhere. See conditions attached.

CONDITIONS UNDER WHICH RUBBER SEEDS OR PLANTS MAY BE
IMPORTED INTO QUEENSLAND FROM SINGAPORE.

1. The Department of Agriculture and Stock, Brisbane, to be notified of intending importations.

2. The importer to give an undertaking that the seeds or plants shall, for at least three months after arrival in Queensland, remain in a place approved by the Department of Agriculture and Stock and be subject to such treatment as the Department may require.

3. No imported rubber seeds or plants are to be placed within one mile of a coffee-tree during the time of quarantine.

4. Seeds or plants imported from Singapore are to be accompanied by a certificate to the effect that they have been packed under the supervision of the Director of the Botanic Gardens, Singapore, and are quite free from disease.

Department of Agriculture and Stock,
Brisbane, 6th August, 1907.

IMPORTS OF FRUIT, Etc., INTO VICTORIA.

The following Regulations relating to the importation of fruit, plants, trees, &c., into the State of Victoria have been promulgated by the Victorian Minister for Agriculture:—

1. Inspectors are authorised and required to charge the following fees and expenses for examining citrus fruits imported, introduced, or brought into Victoria:—

For each case or package not exceeding one bushel in capacity, One halfpenny.

The inspection fee for bananas is now 1d. per bunch or case.

For each case or package exceeding one bushel in capacity, One penny.

2. Such fees and expenses shall be paid by the owner or the person in possession to the inspector.

“QUEENSLAND GOVERNMENT MINING JOURNAL,”

PUBLISHED MONTHLY,

(Under the Authority of the Mines Department),

And contains the most Authentic Information pertaining to Mining Matters
in Queensland.

Publishers: GORDON & GOTCH, Queen street, Brisbane, and 15
St. Bride street, Ludgate Circus, London, E.C.

Copies can likewise be obtained from Booksellers on the Mining Fields of
the State and in the Australasian Capitals. Also, from the

QUEENSLAND GOVERNMENT OFFICE,

Westminster Chambers, Victoria street, London, S.W.

"THE QUEENSLAND FLORA"

By F. MANSON BAILEY, F.L.S.,

Colonial Botanist of Queensland.

WITH PLATES ILLUSTRATING SOME RARE SPECIES.

IN SIX PARTS, OF BETWEEN 300 AND 400 PAGES EACH, ROYAL OCTAVO.

Price, £1 10s. for Complete Work.

Obtainable at the DEPARTMENT of AGRICULTURE and STOCK.

CLEARING LAND.

TREWHELLA BROS.' PATENT JACKS ARE
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THE
MONKEY JACK

Is Specially Designed for
Heavier Stump-grubbing
and Tree-extracting.



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Is Specially Designed for
Lighter Stump-grubbing
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GIVES ONE MAN MORE THAN THE POWER OF TEN.
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A. ROBINSON,
55 ADELAIDE STREET, BRISBANE. — (Queensland Depot.)

LIST OF AGRICULTURAL, HORTICULTURAL, AND PASTORAL SOCIETIES AND ASSOCIATIONS IN QUEENSLAND.

Postal Address.	Name of Society.	Name of Secretary.	Show Dates.	
			1907.	1908.
Allora ...	Central Downs Agricultural and Horticultural Association	J. H. Buxton ...	7 Feb.	11 and 12 Feb.
Allora ...	The Allora Farmers' Progress Association	P. Donovan ...		
Amby ...	Amby Farmers' Association ...	W. Jas. Sullivan ...		
Atherton ...	Barron Valley Agricultural, Pastoral, and Industrial Association	G. Bardon ...	24 and 25 July	
Atherton ...	The Atherton District Farmers' Association	Fredk. Stewart ...		
Ayr ...	Lower Burdekin Farmers' Association	G. S. Mackersie ...		
Ayr ...	Lower Burdekin Pastoral, Agricultural, and Industrial Association	I. A. Holmes ...		
Beaudesert ...	Logan and Albert Pastoral and Agricultural Society	A. Winship ...	1 May	
Beenleigh ...	Agricultural and Pastoral Society of Southern Queensland	Wilson Holliday ...	20 Sept.	3 and 4 Sept.
Beenleigh ...	Logan Farming and Industrial Association	Wm. G. Wionnett, Loganlea		
Biggenden ...	Biggenden Agricultural and Pastoral Society	C. J. Stephensen ...	24 and 25 July	9 and 10 July
Blackall ...	Barcoo Pastoral Society ...	...	28 and 29 May	
Blackbutt ...	Farmers' Progress Association ...	John Dreghorn ...		
Boonah ...	Fassifern and Dugandan Agricultural and Pastoral Association	C. E. Mackenzie ...	27 and 28 June	13 and 14 May
Booyal ...	Booyal Farmers' Progress Association	N. Rosenlund ...		
Bowen ...	Pastoral, Agricultural, and Mining Association	A. W. Kirke ...		
Bowen ...	Proserpine Farmers and Settlers' Association	J. Cooper ...		
Bowen(Proserpine) ...	Cannon Valley Farmers and Settlers' Association	J. H. Ryan ...		
Bowen ...	Bowen Farmers and Fruitgrowers' Association	H. C. Smethurst ...		
Brisbane ...	Horticultural Society of Queensland	F. W. Woodruffe ...		
Brisbane ...	Queensland Acclimatisation Society	H. J. Johnson ...		
Brisbane ...	National Agricultural and Industrial Association of Queensland	Charles A. Arvier	13, 14, 15, 16, and 17 Aug.	10, 11, 12, 13, 14, & 15 Aug.
Brisbane ...	United Pastoralists' Association ...	Fredk. Ranson ...		
Brisbane ...	Queensland Beekeepers' Association	F. Wilsdon Smith		
Brisbane ...	Queensland Chamber of Agriculture	F. W. Peek ...		
Brisbane ...	Queensland Citrus-growers' Association	R. M. Cooper ...		
Brisbane ...	Combined Moreton Association ...	Wm. Ewart ...		
Brookfield ...	The Brookfield and Pullen Vale Farmers, Dairymen, and Fruitgrowers' Association	W. R. Moon ...		
Buderim ...	Buderim Mountain Coffee and Fruit-growers' Association	G. O. Burnett ...		
Buderim Mt. ...	North Coast Central Association ...	James Lindsay ...		
Bundaberg ...	Bundaberg Horticultural and Industrial Society	H. E. Ashley ...		
Bundaberg ...	Council of Agriculture ...	H. J. Page ...		
Bundaberg ...	Bundaberg Agricultural, Pastoral, and Industrial Society	H. J. Page ...	29 and 30 May	
Bundaberg ...	Woongarra Canegrowers and Farmers' Association	Thos. W. Walker		
Burpengary ...	Burpengary Farmers' Association ...	F. W. Uhlmann ...		
Cairns ...	Aloombah Farmers' Association ...	N. P. Petersen ...		
Cairns ...	Cairns Agricultural, Pastoral, and Mining Association	J. Reid ...	5 and 6 Sept.	
Cairns ...	Cairns District Coffee-growers' Association	L. Battinson ...		
Cairns ...	Cairns District United Farmers' Association	Wm. Griffin ...		
Cairns ...	Hambleton Planters' Association ...	A. W. Hawkins ...		
Cardwell ...	Rockingham Progress Association ...	T. E. Fitzsimmons		

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Show Dates.	
			1907.	1908.
Cawdor ...	Highfields and Cawdor Farmers' Association	H. Franken ...		
Cedar Pocket, <i>via</i> Gympie	Cedar Pocket Farmers' Progress Association	Samuel Ericksen ...		
Charleville ...	Central Warrego Pastoral and Agricultural Association	G. M. Bell ...	14 and 15 May	
Charters Towers	Towers Pastoral, Agricultural, and Mining Association	A. H. Pritchard ...	18 and 19 June	
Childers ...	Isis Agricultural Association ...	H. Epps ...		
Childers ...	Doolbi Mill Branch, Isis Agricultural Association	R. S. Rankin ...		
Childers ...	Childers Mill Branch, Isis Agricultural Association	H. Epps ...		
Childers ...	Childers Pastoral, Agricultural, and Industrial Society	A. Eastaughffe ...	12, 13, and 14 June	
Childers ...	The Childers Mill Canegrowers' Association	A. Eastaughffe ...		
Clermont ...	Peak Downs Pastoral, Horticultural, and Agricultural Society	F. Leysley ...		
Cleveland ...	Cleveland Horticultural Society ...	Miles R. Fox ...	31 Aug.	
Clifton ...	Darling Downs Pastoral, Agricultural, and Industrial Association	S. J. B. Just ...		
Columboola ...	The Columboola Farmers and Settlers' Association	Geo. T. Sutton ...		
Coochin ...	The Coochin Farmers' Progress Association	J. T. W. McLaughlin		
Cooyar ...	Yeraman Creek Farmers' Progress Association	M. Harland ...		
Cooran ...	Cooran Progress and Agricultural Association	A. G. Bosanquet ...		
Crow's Nest	The Crow's Nest Agricultural and Horticultural Society	James Gleeson ...		
Croydon ...	The Gulf Mining, Pastoral, and Industrial Association	V. Creagh ...		
Cunnamulla	South Warrego Pastoral Association	J. Winward ...		
Dalby ...	Northern Downs Pastoral and Agricultural Association	E. Watt ...		
Dallarnil Scrub, <i>via</i> Degilbo	Dallarnil Farmers and Dairymen's Progress Association	Vincent H. Jones		
Dallarnil ...	The Dallarnil and Woowoonga Sugar-growers' Association	John C. Robertson		
Dundowran, <i>via</i> Maryborough	Dundowran and Takura Settlers' Association	H. J. E. Tooth ...		
Esk ...	Esk Agricultural, Pastoral, and Industrial Society	J. G. Smith ...	30 April	26 May
Eudlo ...	Eudlo Farmers and Fruitgrowers' Progress Association	Walter T. Jeremy		
Flagstone Ck., <i>via</i> Helidon	Flagstone Creek Farmers' Progress Association	James Scanlan ...		
Forest Hill ...	Forest Hill Agricultural and Progress Association	Wm. Jones ...		
Gayndah ...	Gayndah Pastoral, Industrial, Agricultural, and Horticultural Association	Thomas McMahon	25 and 26 June	
Gayndah ...	Reid's Creek Farmers' Progress Association	George Sutherland		
Geraldton ...	Johnstone River Sugar-growers and Manufacturers' Association	W. Stevenson ...		
Gin Gin ...	Currajong and Gin Gin Agricultural and Pastoral Society	J. R. Hamilton ...	15 June	3 June
Gladstone ...	Gladstone Pastoral and Agricultural Association	W. J. Manning ...		
Gladstone ...	Port Curtis Agricultural, Pastoral, and Mining Association	J. T. W. Brown ...		
Gooburrum, Bundaberg	Gooburrum Farmers and Canegrowers' Association	W. J. Tutin ...		
Goombungee	Goombungee Farmers' Association ...	Thos. Smith ...	23 Jan.	
Goondiwindi	MacIntyre River Pastoral and Agricultural Society	E. T. Drake ...	3 and 4 April	
Gracemere ...	The Gracemere District Farmers and Progress Association	Arthur E. Fisher ...		
Gympie ...	Agricultural, Mining, and Pastoral Society	F. Vaughan ...	21 and 22 Aug.	

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Show Dates.	
			1907.	1908.
Gympie ...	Chatsworth Farmers' Progress Association	W. Allen ..		
Gympie ...	Gympie Horticultural Society ...	Charles Brasch ...		
Gympie ...	Woondum and Brisbane Road Farmers' Progress Association	J. Mullaly ...		
Harrisville ...	Harrisville Farmers' Progress Association	W. J. Burnett ...		
Hatton Vale	Hatton Vale Farmers' Progress Association	P. Sharry, junr. ...		
Headington Hill	Queensland Farmers' Association ...	J. E. Stehn ...		
Helidon ...	Helidon Scrub Farmers' Progress Association	James Sweeney ...		
Helidon ...	Monkey Creek Farmers' Progress Association, Withcott, Helidon	Thomas Turner ...		
Hendra ...	Nundah Agricultural, Horticultural, and Industrial Association	Geo. A. Patullo ...		
Herbert River	Halifax Planters' Club ...	A. Campbell ...		
Herbert River	Macknade Farmers' Association ...	Edwin S. Waller ...		
Herbert River	Fairford Farmers' Association ...	D. G. Scott ...		
Herbert River	United Farmers' Association ...	D. G. Scott ...		
Herberton ...	Mining, Pastoral, and Agricultural Association	John M. Hollway	1 April	
Hodgson ...	Hodgson and Dargal Farmers' Association	I. Stevenson ...		
Hopetoun ...	Hopetoun Pastoral, Agricultural, and Progressive Association	John Walsh ...		
Hughenden ...	Hughenden Pastoral and Agricultural Association	H. G. McLean ...		
Ingham ...	Herbert River Pastoral and Agricultural Association (Agricultural Show)	P. J. Cochrane ...		
Ingham ...	Stone River Farmers' Association ...	W. B. G. Johnson		
Ipswich ...	Ipswich and West Moreton Agricultural and Horticultural Society	P. W. Cameron ...	17 Oct.	
Ipswich ...	Queensland Pastoral and Agricultural Society	J. McGill ...	19, 20, and 21 June	
Ipswich ...	The Amberley Farmers' Progress Association	Clark T. Seymour ...		
Kelsey Creek via Bowen	Kelsey Creek Farmers' Progress Association	A. Fontaine ...		
Kolan, North	Kolan Canegrowers and Farmers' Association	Jas. H. Hendy ...		
Kilkivan ...	Kilkivan District Farmers and Settlers' Progress Association	M. Bambling ...		
Kingaroy ...	Kingaroy Farmer's Association ...	C. H. Hooper ...		
Kingaroy ...	South Burnett Agricultural, Pastoral, and Industrial Society	...	29 and 30 Aug.	10 and 11 June
Laidley ...	Lockyer Agricultural and Industrial Society (at Gatton)	W. A. McIlwraith		
Lakeside ...	Mungore Farmers' Association ...	C. C. Ridley ...		
Longreach ...	Longreach Pastoral and Agricultural Society	J. P. Peterson ...	6 and 7 May	
Lowood ...	The Lowood and Tarampa Pastoral and Agricultural Association	D. E. C. Kroger ...	Sept.	24 June
Ma Ma Creek, via Grantham	Ma Ma Creek Farmers' Progress Association	A. McKenzie ...		
Mackay ...	Agricultural, Pastoral, and Mining Association	F. Black ...		
Mackay ...	Pioneer River Farmers and Graziers' Association	J. P. Moule ...	4 and 5 June	
Mapleton ...	Fruitgrowers and Farmers' Progressive Association	W. J. Smith ...		
Mareeba ...	Mareeba Mining, Pastoral, and Agricultural Association	F. Cruickshank ...	3 and 4 June	
Maryborough	Maryborough Horticultural Society...	A. H. Jones ...		
Maryborough	The Island Farmers' Progress Association	H. Simpson, junr.		
Maryborough	Wide Bay and Burnett Agricultural and Horticultural Society	A. H. Jones ...	22, 23, and 24 May	24, 25, and 26 June
Miriam Vale	Miriam Vale Farmers' Association	J. Spencer ...		
Montville ...	Montville Fruitgrowers and Farmers' Progress Association	C. J. Wyer ...		

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Show Dates.	
			1907.	1908.
Mooloolah ...	Mooloolah Farmers and Fruitgrowers' Progress Association	G. S. Skerman ...		
Mosman ...	Mosman Farmers' Association ...	R. D. Rex ...		
Mount Cotton	Mount Cotton and Redland Bay Fruitgrowers and Farmers' Association	W. E. Burns ...		
Mount Mee...	Mount Mee Farmers' Association ...	Jas. H. Robinson ...		
Mount Morgan	Mount Morgan Agricultural, Pastoral, and Poultry Society	J. S. Lyle ...		
Nambour ...	Dulong and Kureelpa Farmers and Canegrowers' Association	A. A. Petrie ...		
Nambour ...	Obi Obi Farmers and Dairymen's Progressive Association	H. Robinson ...		
Nanango ...	Nanango Agricultural, Pastoral, and Mineral Society	J. W. Sigley ...	25 and 26 April	
Nanango ...	North Barker's Creek Farmers' Association	A. Becker ...		
Nerang ...	Southern Queensland and Border Agricultural and Pastoral Association	H. J. Cooper ...	18 Oct.	
North Isis ...	North Isis Canegrowers' Association	T. E. Barnes ...		
North Pine ...	Moreton Agricultural, Horticultural, and Industrial Association	D. McQ. Fraser ...	...	10 and 11 July
Oakey, <i>via</i> Eumundi	Kenilworth Farmers' Association ...	Thos. H. Gordon...		
Oakey ...	Oakey Agricultural and Pastoral Society	E. R. Pace ...		
Palmwoods ...	Palmwoods Industrial Fruitgrowers' Progress Association	H. Taylor ...		
Peachester, <i>via</i> Beerwah, N.C. Line	The Peachester Progress Association	W. Vieritz ...		
Pittsworth ...	Pittsworth Pastoral, Agricultural, and Horticultural Association	John J. Daniel, senr.	30 Jan.	29 Jan.
Pomona ...	Pomona Agricultural and Progress Association	H. J. Scott ...		
Port Douglas	Port Douglas and Mosman Pastoral, Agricultural, Horticultural, and Mining Association	H. McMahon ...	August (Date not fixed)	
Proserpine ...	Preston Farmers and Settlers' Association	T. Duval ...		
Proserpine ...	Preston Farmers and Canegrowers' Association	R. C. Dagg ...		
Proserpine ...	Cannon Valley and District Farmers' Progress Association	W. A. Compton ...		
Roadvale ...	Roadvale Progress Association ...	Henry Clark ...		
Rockhampton	Alton Downs Farmers' Association...	G. T. Crook ...		
Rockhampton	Central Queensland Farmers and Selectors' Association	T. Whitely, Coowonga		
Rockhampton	Central Queensland Stockowners' Association	R. R. Dawbarn ...		
Rockhampton	Rockhampton Agricultural Society...	A. C. Lyons ...	20, 21, and 22 June	11, 12, and 13 June
Roma ...	Western Pastoral and Agricultural Association of Queensland	Angus McPherson	16 and 17 July	
Roma ...	Yingerbay Farmers' Association ...	R. Frederick ...		
Roma (Blythedale)	Warooby Farmers' Association ...	Geo. Munt...		
Roma ...	Euthulla Farmers and Fruitgrowers' Association	J. Bates ...		
Roma ...	The United Maranoa Farmers' Association	R. Frederick, senr.		
Rosewood ...	Farmers' Club ...	P. H. Adams ...	29 and 30 May	15 and 16 July
Southport ...	Southport Horticultural Society ...	E. Fass ...		
Springsure ...	Queensland Pastoral Society...	G. R. Milliken ...		
Springsure ...	The Springsure Pastoral and Agricultural Society	H. E. Laver ...	...	30 April
Stanthorpe ...	Border Pastoral, Agricultural, and Mining Society	Geo. Simcocks ...	21 and 22 Feb.	20 and 21 Feb.

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Show Dates.	
			1907.	1908.
St. George ...	Balonne Pastoral and Agricultural Society	T. M. Cummings ...	7 and 8 May	
Sydney ...	Royal Agricultural Society of New South Wales	...	7, 8, 9, and 10 Aug.	
Takura (Pialba line)	Takura Farmers' Progress Association	S. E. Tooth ...		
Teutoberg ...	Teutoberg Farmers' Progress Association	E. M. Nothling ...		
Tinana ...	Tinana Fruitgrowers and Farmers' Association	H. G. Habler ...		
Tingoora ...	Tingoora Farmers' Progress Association	Arthur Boisen ...	6, 7, 8, and 9 Aug.	
Toowoomba...	Royal Agricultural Society of Queensland	G. A. Leichney ...		
Townsville ...	Townsville Pastoral, Agricultural, and Industrial Association (formerly North Queensland Pastoral and Agricultural Association)	J. N. Parkes ...	2 and 3 July	
Upper Kedron	Upper Kedron Fruitgrowers and Farmers' Association	A. Marshall ... A. Pickering ...		
Wallumbilla	Wallumbilla Farmers' Association ...	A. Budd ...		
Warren Siding	The Stanwell United District Farmers' Union	G. N. Terry ...		
Warwick ...	Eastern Downs Horticultural and Agricultural Association	F. H. Selke ...	12, 13, and 14 Feb.	
Wellington Point	Wellington Point Agricultural, Horticultural, and Industrial Association	Victor Drury ...	18 Sept.	
West Haldon, via Greenmount	West Haldon Farmers' Progress Association	A. E. Ayris ...		
Wondai ..	Mondure Farmers' Progress Association	S. R. Monteith ...		
Woolloom-gabba	Queensland Dairy Herdbook Society	Alfred Gorrie ...		
Woombye ...	Maroochy Pastoral, Agricultural, Horticultural, and Industrial Society	P. S. Hungerford...	...	15 and 16 July
Woombye ...	Woombye Fruitgrowers' and Progress Association	E. E. McNall ...		
Wooroolin ...	Wooroolin Farmers' Progress Association	A. Deighton ...		
Wooroolin (Memerambi Siding)	Memerambi Farmers' Progress Association	J. E. Reid ...		
Yandina ...	Yandina Agricultural and Progress Association	W. R. Brayden ...		
Yingerbay ...	United Farmers' Association of the Maranoa	R. Frederich ...		
Zillmere ...	Zillmere Horticultural Society ...	E. H. Decker ...		

Societies and associations desirous of being registered and placed on the above list must make application to that effect, and forward to the Under Secretary for Agriculture and Stock the following particulars:—

Number of members who have paid their subscriptions for 1907.

Number of meetings held by the Society during 1907.

Date of the last meeting.

Name of the Secretary for 1908.

Departmental Announcements.

The EDITOR will be glad to receive any papers of special merit which may be read at meetings of Agricultural and Pastoral Associations in Queensland, reserving, however, the right to decide whether their value and importance will justify their publication.

Secretaries of Associations are requested to be good enough to forward to the EDITOR, as early as possible, the dates of forthcoming Shows, as it is important in the interests of the Associations that these dates should be published.

To enable recipients of the *Queensland Agricultural Journal* to have the half-yearly volume bound, covers in boards and cloth will be supplied from this office on application to the Under Secretary for Agriculture and Stock. Applications must be accompanied by a remittance of SIXPENCE to cover cost. For the convenience of those who are not within reach of a bookbinder, a Special Cover has been designed, which obviates the necessity for binding. These covers will be supplied at ONE SHILLING each.

In order to avoid disappointment, correspondents who wish for replies to questions in the *Journal* are requested to note that it is imperative that all matter for publication on the first day of any month should reach the Editor by the 15th of the previous month.

For the information of those who are desirous of communicating with the managers of State farms, we give their names and addresses below:—Queensland Agricultural College, Gatton, principal, J. Mahon; Westbrook State Farm, Westbrook, manager, C. Ross; Biggenden State Farm, Biggenden, manager, D. Macpherson; Hermitage State Farm, Warwick, manager, John Liverseed; Gindie State Farm, manager, R. Jarrott; Kamerunga State Nursery, Cairns, manager, Howard Newport; Roma State Farm, manager, R. Soutter; Botanic Gardens, director, J. F. Bailey.

It is notified, for the information of intending Visitors to the Queensland Agricultural College, that the Second Wednesday in each month has been set apart for the reception of Parties of Farmers and others desirous of inspecting the Institution. Supplies of hot water and milk can be obtained at the College, if desired.

NOTICE OF SHOW DATES.

We wish to draw the attention of Secretaries of Agricultural and Pastoral Societies and Associations to the importance of promptly notifying the Editor of any change in the dates on which shows are to be held.

THE BOUNTIES ACT.

The Department of Agriculture and Stock have received from the Comptroller-General of Customs, Melbourne, a number of copies of "Memorandum for Information of Growers" and "Form of Notice of Intention to Claim Bounty" under the Commonwealth Bounties Act. Should any grower desire a copy of either the above, same will be supplied upon application to the Under Secretary, Department of Agriculture and Stock, Brisbane.

QUEENSLAND AGRICULTURAL COLLEGE.

FOR SALE.

PURE-BRED PIGS, all from imported stock, including Berkshire and Large and Middle Yorkshires. BOARS, 2 GUINEAS; SOWS, 1 GUINEA each; f.o.b. Gatton.

Poultry of the following breeds:—Brown Leghorns, Silver-grey Dorkings, Old English Spangled Game, Plymouth Rocks, Minorcas, White Wyandottes, Silver-laced Wyandottes, Black Orpingtons, Buff Orpingtons, White Leghorns. Prices, from 10s. each, f.o.b. Gatton.

Eggs of the above breeds are available in the season—1st July to 31st December; and nine out of each setting are guaranteed fertile. Should less than nine prove to be fertile, the infertiles will be replaced if returned carriage paid. This rule will be strictly adhered to. Price, 10s. per setting, for all breeds, f.o.b. Gatton.

Applications for Setting of Eggs, accompanied by Remittance, may be made to the Principal, Queensland Agricultural College.

A few Settings of American Bronze-wing Turkey Eggs will be available at 15s. per setting, f.o.b. Gatton.

As it has been decided that all surplus stock is to be disposed of by auction sales to be held annually, no pure-bred bulls will be available for private sale.

The following Stud Animals are available for Service at the College Farm, at a charge of 10s. for pure-bred and 5s. for grade cows:—Imported Shorthorn, Jersey, Holstein, and Guernsey Bulls.

The following Bulls imported from Great Britain are also available for Service at a charge of 10s. for all cows:—

Ayrshire Bull, SPECULATION.

Shorthorn Bull, BURTON SPOT.

Sows may be served also by imported Berkshire, British Large Black, and Yorkshire Pigs, at a charge of 5s. for each service.

Paspalum Roots will be supplied to purchasers at 2s. 6d. per sack, f.o.b. Gatton. Applicants will be supplied on receipt of remittance to the amount of the order.

Small quantities of Roots of the following Grasses will also be available for disposal:—Rhodes Grass, Wonder Grass.

Seeds for Sale:—Cowpea, Sunflower, Sorghums, Panicum.

JOHN MAHON, Principal.

QUEENSLAND AGRICULTURAL COLLEGE.

The College, which is situated within 4 miles of Gatton and 1 mile from the College Railway Siding, comprises 1,692 acres, and the buildings can accommodate 60 Students.

TERMS.

TWENTY-SEVEN POUNDS per annum, paid half-yearly in advance. Students are also charged One Pound per annum each for medical attendance, the sports fund, and for guarantee fee.

The course of instruction includes PRACTICAL AGRICULTURE in all its branches, DAIRYING, GARDENING, STOCK-BREEDING, and MECHANICAL ARTS. Classes are also held daily for THEORETICAL INSTRUCTION in these branches, as well as in SURVEYING, CHEMISTRY, &c.

The College Calendar, giving full particulars, may be obtained on application to the Principal at the College, or to the Under Secretary for Agriculture and Stock, Brisbane.

BURSARIES.

Four bursaries are given annually. An examination for these is held in June or July of each year. Bursaries will be awarded upon the following conditions:—Candidates (males) to be from sixteen to eighteen years of age, of sound constitution, and in good health; they must have resided in the State for the two years immediately preceding the time of their examination for such bursary, or their parents must have resided in the State three years immediately preceding such examination. The bursar is entitled—subject to good behaviour and the pleasure of Parliament—to free board and instruction as a resident student for a period of three years. He is required to take up his residence at the College within one month of the publication of the results of the examination; otherwise he forfeits his right to a bursary.

The AGE of CANDIDATES for Admission to the College as Students is Sixteen Years.

HERMITAGE STATE FARM.

FOR SALE.

PURE-BRED MIDDLE YORKSHIRE BOARS (Progeny of Imported Stock), £2 2s. each on rail at Hermitage.

TURKEY GOBBLERS, 11 months old, THIRTY SHILLINGS each on rail at Hermitage.

FOR SERVICE—

Middle Yorkshire Boar, HOLYWELL CHUB (Imported)

Berkshire Boar, YOUNG BOOMERANG (Imported).

Full particulars on application to THE MANAGER, State Farm, Hermitage.

STATE FARM, WESTBROOK.

CANARY GRASS

(*Phalaris commutata*).

This is the best all-the-year-round grass as yet introduced for Green Cutting, Hay, or Feeding-off. Planting should be done during the Winter and Early Spring, before hot dry weather sets in. It is particularly luxuriant in winter, and behaves remarkably well during the hot dry months. The Manager believes it will flourish in any part of the Commonwealth.

Rootlings: Two SHILLINGS AND SIXPENCE per Dozen, or TWELVE SHILLINGS per 100.

Seed is now ready for distribution. Price, £1 1s. per lb., or 1s. and 2s. 6d. packet, Post Free.

To expedite delivery, application should be made direct to the MANAGER, Westbrook State Farm, together with remittance to cover the cost of Rootlets and Freight.

STATE SCHOOLS will be supplied with Small Parcels of Rootlings of the above FREE OF CHARGE.

Applications, however, must include cost of freight.

POULTRY.

GOLDEN WYANDOTTE COCKERELS, from Heavy Laying Strains, FOR SALE. Price: SEVEN SHILLINGS AND SIXPENCE each. Apply to
THE MANAGER.

PURCHASE OF STOCK AND PRODUCE FROM THE DEPARTMENT OF AGRICULTURE

—:0:—

Purchasers of Stock and Produce, Plants, Seed, &c., from the State Farms and Agricultural College are reminded that Sales from these Institutions are made for Cash only. Persons desirous of making purchases should, therefore, first ascertain the cost of whatever articles they desire to obtain, and remit the full purchase-money when sending an order.

IMPORTATION OF FRUIT OR PLANTS INTO NEW ZEALAND.

(Extract from the "New Zealand Gazette" of 27th February, 1908.)

By an Order in Council, gazetted on the 20th February, 1908, the New Zealand Government have revoked all previous Proclamations and Orders in Council, dated respectively from 6th July, 1897, to 22nd January, 1908, referring to the importations into New Zealand of grape vines—rooted and cuttings—fruit infested with Queensland fruit fly, scale-infested plants and fruit, or with apple scab or black spot, or potatoes infested with Irish blight, or potato moth.

The new regulations declare that the only ports of entry for fruit or plants are—for fruit only, Bluff; for fruit and plants, Auckland, Wellington, Christchurch, Dunedin. They also provide for the inspection of fruit on arrival at the above ports, and for fumigation or destruction of shipments unaccompanied by a certificate signed by the shipper, and another signed by an officer of the Department of Agriculture of the State where the fruit was grown, certifying that the fruit is clean and free from disease. Full particulars will be found by anyone interested in shipping fruit to New Zealand in the "New Zealand Gazette" of 27th February, 1908.

STATE NURSERY, KAMERUNGA, CAIRNS.

RUBBER, COCOA, KOLA-NUT, CAROB BEAN, KAPOCK, VANILLA, CARDAMOM, BREADFRUIT, DIVI-DIVI, GINGER, AND OTHER VALUABLE TROPICAL ECONOMIC PLANTS FOR SALE, AT NOMINAL RATES, TO SETTLERS AND FARMERS.

The Instructor in Tropical Agriculture notifies that PLANTS or SEEDS of the above useful and valuable AUXILIARY PRODUCTS may be obtained by application to the Manager, Kamerunga State Nursery. PLANTS available at any time. SEEDS when in season, BEING MOSTLY OF SHORT VITALITY, should be promptly applied for.

RUBBERS, KAPOCK, CARDAMOM, and especially rare Plants, or Seedlings difficult to raise, 1s. each, or 10s. per dozen; others, 6d. each, or 5s. per dozen. Seed, 6d. per packet. Plus packing, railage, or postage.

Remittances should accompany applications.

Lists of Tropical Economic Plants available may be obtained on application to the Manager, Kamerunga State Nursery, Cairns, North Queensland.

RUBBER SEEDS AND PLANTS.

Variety and Name.	Plants or Seed.	When Available.	Price.
Rambong or Assam (<i>Ficus elastica</i>)	Plants only	Any time ...	1s. each, 10s. per doz.
Para Rubber (<i>Hevea braziliensis</i>) } *	Plants ...	„ „ ...	3d. each
„ „ „ „ }	Seed ...	Feb. to April	1s. per oz. (about 1 doz.
Central American (<i>Castilloa elastica</i>)	Plants ...	Any time ...	6d. each, 5s. per doz.
„ „ „ „ „	Seed ...	Nov. to Jan.	1s. per oz. (about 100)
Iré or Logos Rubber (<i>Funtumia elastica</i>)	Plants only	Any time ...	1s. each, 12s. per doz.
Ceara Rubber (<i>Manihot Glaziovii</i>)	Seed only	„ „ ...	1s. per oz. (about 50)
West African Rubber (<i>Tabernæmontana</i>)	Plants ...	„ „ ...	6d. each, 5s. per doz.
„ „ „ „ (<i>Crassa</i>)	Seed ...	„ „ ...	1s. per oz. (about 150)

Above prices are for delivery on the Nursery. If applicants wish Plants or Seed sent, packing, postages, railage to port, &c., are extra. Seed and small quantities of Plants may be sent by parcels post at purchaser's risk. Plants, being delicate, do not travel well by post.

Hessian-covered cases, holding one to three dozen, cost 4s. 6d. extra f.o.b. Cairns, whence they will be shipped "freight on." The demand for Seed being large and the supply limited, Orders received, with remittance, will be booked and completed as soon as Seed is available.

* Owing to the limited supply of plants and seed available at the Nursery, settlers requiring large numbers may, by special arrangement of the Department, import in quantity from Singapore or elsewhere. See conditions attached.

CONDITIONS UNDER WHICH RUBBER SEEDS OR PLANTS MAY BE
IMPORTED INTO QUEENSLAND FROM SINGAPORE.

1. The Department of Agriculture and Stock, Brisbane, to be notified of intending importations.

2. The importer to give an undertaking that the seeds or plants shall, for at least three months after arrival in Queensland, remain in a place approved by the Department of Agriculture and Stock and be subject to such treatment as the Department may require.

3. No imported rubber seeds or plants are to be placed within one mile of a coffee-tree during the time of quarantine.

4. Seeds or plants imported from Singapore are to be accompanied by a certificate to the effect that they have been packed under the supervision of the Director of the Botanic Gardens, Singapore, and are quite free from disease.

Department of Agriculture and Stock,
Brisbane, 6th August, 1907.

“QUEENSLAND GOVERNMENT MINING JOURNAL,”

PUBLISHED MONTHLY,

(Under the Authority of the Mines Department),

And contains the most Authentic Information pertaining to Mining Matters
in Queensland.

Publishers: GORDON & GOTCH, Queen street, Brisbane, and 15
St. Bride street, Ludgate Circus, London, E.C.

Copies can likewise be obtained from Booksellers on the Mining Fields of
the State and in the Australasian Capitals. Also, from the

QUEENSLAND GOVERNMENT OFFICE,
Westminster Chambers, Victoria street, London, S.W.

“THE QUEENSLAND FLORA”

BY F. MANSON BAILEY, F.L.S.,

Colonial Botanist of Queensland.

WITH PLATES ILLUSTRATING SOME RARE SPECIES.

IN SIX PARTS, OF BETWEEN 300 AND 400 PAGES EACH, ROYAL OCTAVO.

Price, £1 10s. for Complete Work.

Obtainable at the DEPARTMENT of AGRICULTURE and STOCK.

CLEARING LAND.

TREWHELLA BROS.' PATENT JACKS ARE
UNSURPASSED FOR THIS WORK.

THE
MONKEY JACK

Is Specially Designed for
Heavier Stump-grubbing
and Tree-extracting.



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WALLABY JACK

Is Specially Designed for
Lighter Stump-grubbing
and Tree-extracting.

GIVES ONE MAN MORE THAN THE POWER OF TEN
SAVES ITS COST EASILY WITHIN THREE MONTHS.

Inquire Particulars of Leading Ironmongers and Storekeepers; or Send for Catalogues to

A. ROBINSON,
55 ADELAIDE STREET, BRISBANE. — (Queensland Depot.)

IMPORTS OF FRUIT, ETC., INTO VICTORIA.

The following Regulations relating to the importation of fruit, plants, trees, &c., into the State of Victoria have been promulgated by the Victorian Minister for Agriculture:—

1. Inspectors are authorised and required to charge the following fees and expenses for examining citrus fruits imported, introduced, or brought into Victoria:—

For each case or package not exceeding one bushel in capacity, One halfpenny.

The inspection fee for bananas is now 1d. per bunch or case.

For each case or package exceeding one bushel in capacity, One penny.

2. Such fees and expenses shall be paid by the owner or the person in possession to the inspector.

By Authority: GEORGE ARTHUR VAUGHAN, Government Printer, William street, Brisbane.

LIST OF AGRICULTURAL, HORTICULTURAL, AND PASTORAL SOCIETIES AND ASSOCIATIONS IN QUEENSLAND.

Postal Address.	Name of Society.	Name of Secretary.	Show Dates.	
			1907.	1908.
Allora ...	Central Downs Agricultural and Horticultural Association	J. H. Buxton ...	7 Feb.	11 and 12 Feb.
Allora ...	The Allora Farmers' Progress Association	P. Donovan ...		
Amby ...	Amby Farmers' Association ...	W. Jas. Sullivan ...		
Atherton ...	Barron Valley Agricultural, Pastoral, and Industrial Association	G. Bardon ...	24 and 25 July	
Atherton ...	The Atherton District Farmers' Association	Fredk. Stewart ...		
Ayr ...	Lower Burdekin Farmers' Association	G. S. Mackersie ...		
Ayr ...	Lower Burdekin Pastoral, Agricultural, and Industrial Association	I. A. Holmes ...		
Beaudesert ...	Logan and Albert Pastoral and Agricultural Society	A. Winship ...	1 May	
Beenleigh ...	Agricultural and Pastoral Society of Southern Queensland	Wilson Holliday ...	20 Sept.	3 and 4 Sept.
Beenleigh ...	Logan Farming and Industrial Association	Wm. G. Winnett, Loganlea		
Biggenden ...	Biggenden Agricultural and Pastoral Society	C. J. Stephensen ...	24 and 25 July	9 and 10 July
Blackall ...	Barcoo Pastoral Society ...	...	28 and 29 May	
Blackbutt ...	Farmers' Progress Association ...	John Dreghorn ...		
Beonah ...	Fassifern and Dugandan Agricultural and Pastoral Association	C. E. Mackenzie ...	27 and 28 June	13 and 14 May
Booyal ...	Booyal Farmers' Progress Association	N. Rosenlund ...		
Bowen ...	Pastoral, Agricultural, and Mining Association	A. W. Kirke ...		
Bowen ...	Proserpine Farmers and Settlers' Association	J. Cooper ...		
Bowen(Proserpine) ...	Cannon Valley Farmers and Settlers' Association	J. H. Ryan ...		
Bowen ...	Bowen Farmers and Fruitgrowers' Association	H. C. Smethurst ...		
Brisbane ...	Horticultural Society of Queensland	F. W. Woodruffe ...		
Brisbane ...	Queensland Acclimatisation Society	H. J. Johnson ...		
Brisbane ...	National Agricultural and Industrial Association of Queensland	Charles A. Arvier	13, 14, 15, 16, and 17 Aug.	10, 11, 12, 13, 14, & 15 Aug.
Brisbane ...	United Pastoralists' Association ...	Fredk. Ranson		
Brisbane ...	Queensland Beekeepers' Association	F. Wilsdon Smith		
Brisbane ...	Queensland Chamber of Agriculture	F. W. Peek ...		
Brisbane ...	Queensland Citrus-growers' Association	R. M. Cooper ...		
Brisbane ...	Combined Moreton Association ...	Wm. Ewart ...		
Brookfield ...	The Brookfield and Pullen Vale Farmers, Dairymen, and Fruitgrowers' Association	W. R. Moon ...		
Buderim ...	Buderim Mountain Coffee and Fruitgrowers' Association	G. O. Burnett ...		
Buderim Mt. ...	North Coast Central Association ...	James Lindsay ...		
Bundaberg ...	Bundaberg Horticultural and Industrial Society	H. E. Ashley ...		
Bundaberg ...	Council of Agriculture ...	H. J. Page ...		
Bundaberg ...	Bundaberg Agricultural, Pastoral, and Industrial Society	H. J. Page ...	29 and 30 May	
Bundaberg ...	Woongarra Canegrowers and Farmers' Association	Thos. W. Walker		
Burpengary ...	Burpengary Farmers' Association ...	F. W. Uhlmann ...		
Cairns ...	Aloombah Farmers' Association ...	N. P. Petersen ...		
Cairns ...	Cairns Agricultural, Pastoral, and Mining Association	J. Reid ...	5 and 6 Sept.	20 and 21 July
Cairns ...	Cairns District Coffee-growers' Association	L. Battinson ...		
Cairns ...	Cairns District United Farmers' Association	Wm. Griffin ...		
Cairns ...	Hambleton Planters' Association ...	A. W. Hawkins ...		
Cardwell ...	Rockingham Progress Association ...	T. E. Fitzsimmons		
Cawdor ...	Highfields and Cawdor Farmers' Association	H. Franken ...		

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Show Dates.	
			1907.	1908.
Cedar Pocket, <i>viâ</i> Gympie	Cedar Pocket Farmers' Progress Association	Samuel Ericksen ...		
Charleville ...	Central Warrego Pastoral and Agricultural Association	G. M. Bell ...	14 and 15 May	
Charters Towers	Towers Pastoral, Agricultural, and Mining Association	A. H. Pritchard ...	18 and 19 June	
Childers ...	Isis Agricultural Association ...	H. Epps ...		
Childers ...	Doolbi Mill Branch, Isis Agricultural Association	R. S. Rankin ...		
Childers ...	Childers Mill Branch, Isis Agricultural Association	H. Epps ...		
Childers ...	Childers Pastoral, Agricultural, and Industrial Society	A. Eastaughffe ...	12, 13, and 14 June	
Childers ...	The Childers Mill Canegrowers' Association	A. Eastaughffe ...		
Clermont ...	Peak Downs Pastoral, Horticultural, and Agricultural Society	F. Leysley ..		
Cleveland ...	Cleveland Horticultural Society ...	Miles R. Fox ...	31 Aug.	
Clifton ...	Darling Downs Pastoral, Agricultural, and Industrial Association	S. J. B. Just ...		
Columboola ...	The Columboola Farmers and Settlers' Association	Geo. T. Sutton ...		
Coochin ...	The Coochin Farmers' Progress Association	J. T. W. McLaughlin		
Cooktown ...	Cook District Pastoral, Agricultural, Mining, and Industrial Association	E. A. S. Olive ...	...	8 June
Cooyar ...	Yeraman Creek Farmers' Progress Association	M. Harland ...		
Cooran ...	Cooran Progress and Agricultural Association	A. G. Bosanquet ...		
Crow's Nest	The Crow's Nest Agricultural and Horticultural Society	James Gleeson ...		
Croydon ...	The Gulf Mining, Pastoral, and Industrial Association	V. Creagh ...		
Cunnamulla	South Warrego Pastoral Association	J. Winward ...		
Dalby ...	Northern Downs Pastoral and Agricultural Association	E. Watt ...		
Dallarnil Scrub, <i>viâ</i> Degilho	Dallarnil Farmers and Dairymen's Progress Association	H. J. Piper ...		
Dallarnil ...	The Dallarnil and Woowoonga Sugar-growers' Association	John C. Robertson		
Dundowran, <i>viâ</i> Maryborough	Dundowran and Takura Settlers' Association	H. J. E. Tooth ...		
Esk ...	Esk Agricultural, Pastoral, and Industrial Society	J. G. Smith ...	30 April	26 May
Eudlo ...	Eudlo Farmers and Fruitgrowers' Progress Association	Walter T. Jeremy		
Flagstone Ck., <i>viâ</i> Helidon	Flagstone Creek Farmers' Progress Association	James Scanlan ...		
Forest Hill ...	Forest Hill Agricultural and Progress Association	Wm. Jones ...		
Gayndah ...	Gayndah Pastoral, Industrial, Agricultural, and Horticultural Association	M. C. Stephenson	25 and 26 June	9 and 10 June
Gayndah ...	Reid's Creek Farmers' Progress Association	George Sutherland		
Geraldton ...	Johnstone River Sugar-growers and Manufacturers' Association	W. Stevenson ...		
Gin Gin ...	Currajong and Gin Gin Agricultural and Pastoral Society	J. R. Hamilton ...	15 June	3 June
Gladstone ...	Gladstone Pastoral and Agricultural Association	W. J. Manning ...		
Gladstone ...	Port Curtis Agricultural, Pastoral, and Mining Association	J. T. W. Brown ...		
Gooburrum, Bundaberg	Gooburrum Farmers and Cane-growers' Association	W. J. Tutin ...		
Goombungee	Goombungee Farmers' Association ...	Thos. Smith ...	23 Jan.	
Goondiwindi	MacIntyre River Pastoral and Agricultural Society	E. T. Drake ...	3 and 4 April	
Gracemere ...	The Gracemere District Farmers and Progress Association	Arthur E. Fisher ...		
Gympie ...	Agricultural, Mining, and Pastoral Society	F. Vaughan ...	21 and 22 Aug.	

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Show Dates.	
			1907.	1908.
Gympie ...	Chatsworth Farmers' Progress Association	W. Allen ...		
Gympie ...	Gympie Horticultural Society	Charles Brasch ...		
Gympie ...	Woondum and Brisbane Road Farmers' Progress Association	J. Mullaly ...		
Harrisville ...	Harrisville Farmers' Progress Association	W. J. Burnett ...		
Hatton Vale	Hatton Vale Farmers' Progress Association	P. Sharry, junr. ...		
Headington Hill	Queensland Farmers' Association	J. E. Stehn ...		
Helidon ...	Helidon Scrub Farmers' Progress Association	James Sweeney ...		
Helidon ...	Monkey Creek Farmers' Progress Association, Withcott, Helidon	Thomas Turner ...		
Hendra ...	Nundah Agricultural, Horticultural, and Industrial Association	Geo. A. Patullo ...		
Herbert River	Halifax Planters' Club	A. Campbell ...		
Herbert River	Macknade Farmers' Association	Edwin S. Waller ...		
Herbert River	Fairford Farmers' Association	D. G. Scott ...		
Herbert River	United Farmers' Association	D. G. Scott ...		
Herberton ...	Mining, Pastoral, and Agricultural Association	John M. Hollway	1 April	
Hodgson ...	Hodgson and Dargal Farmers' Association	I. Stevenson ...		
Hopetoun ...	Hopetoun Pastoral, Agricultural, and Progressive Association	John Walsh ...		
Hughenden ...	Hughenden Pastoral and Agricultural Association	H. G. McLean ...		
Ingham ...	Herbert River Pastoral and Agricultural Association (Agricultural Show)	P. J. Cochrane ...	...	14 and 15 Aug.
Ingham ...	Stone River Farmers' Association	W. B. G. Johnson		
Ipswich ...	Ipswich and West Moreton Agricultural and Horticultural Society	P. W. Cameron ...	17 Oct.	
Ipswich ...	Queensland Pastoral and Agricultural Society	J. McGill ...	19, 20, and 21 June	
Ipswich ...	The Amberley Farmers' Progress Association	Clark T. Seymour ...		
Kelsey Creek <i>via</i> Bowen	Kelsey Creek Farmers' Progress Association	A. Fontaine ...		
Kolan, North	Kolan Canegrowers and Farmers' Association	Jas. H. Hendy ...		
Kilkivan ...	Kilkivan District Farmers and Settlers' Progress Association	M. Bambling ...		
Kingaroy ...	Kingaroy Farmer's Association	C. H. Hooper ...		
Kingaroy ...	South Burnett Agricultural, Pastoral, and Industrial Society	...	29 and 30 Aug.	10 and 11 June
Laidley ...	Lockyer Agricultural and Industrial Society (at Gatton)	W. A. McIlwraith		
Lakeside ...	Mungore Farmers' Association	C. C. Ridley ...		
Longreach ...	Longreach Pastoral and Agricultural Society	J. P. Peterson ...	6 and 7 May	
Lowood ...	The Lowood and Tarampa Pastoral and Agricultural Association	D. E. C. Kroger ...	Sept.	24 June
Ma Ma Creek, <i>via</i> Grantham	Ma Ma Creek Farmers' Progress Association	A. McKenzie ...		
Mackay ...	Agricultural, Pastoral, and Mining Association	F. Black ...		
Mackay ...	Pioneer River Farmers and Graziers' Association	J. P. Moule ...	4 and 5 June	17 and 18 June
Mapleton ...	Fruitgrowers and Farmers' Progressive Association	W. J. Smith ...		
Mareeba ...	Mareeba Mining, Pastoral, and Agricultural Association	F. Cruckshank ...	3 and 4 June	
Maryborough	Maryborough Horticultural Society	A. H. Jones ...		
Maryborough	The Island Farmers' Progress Association	H. Simpson, junr.		
Maryborough	Wide Bay and Burnett Agricultural and Horticultural Society	A. H. Jones ...	22, 23, and 24 May	24, 25, and 26 June
Miriam Vale	Miriam Vale Farmers' Association	J. Spencer ...		
Montville ...	Montville Fruitgrowers and Farmers' Progress Association	C. J. Wyer ...		

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Show Dates.	
			1907.	1908.
Mooloolah ..	Mooloolah Farmers and Fruitgrowers' Progress Association	G. S. Skerman ...		
Mosman ...	Mosman Farmers' Association ...	R. D. Rex ...		
Mount Cotton	Mount Cotton and Redland Bay Fruitgrowers and Farmers' Association	W. E. Burns ...		
Mount Mee...	Mount Mee Farmers' Association ...	Jas. H. Robinson ...		
Mount Morgan	Mount Morgan Agricultural, Pastoral, and Poultry Society	J. S. Lyle ...		
Nambour ...	Dulong and Kureelpa Farmers and Canegrowers' Association	A. A. Petrie ...		
Nambour ...	Obi Obi Farmers and Dairymen's Progressive Association	H. Robinson ...		
Nanango ...	Nanango Agricultural, Pastoral, and Mineral Society	J. W. Sigley ...	25 and 26 April	
Nanango ...	North Barker's Creek Farmers' Association	A. Becker ...		
Nerang ...	Southern Queensland and Border Agricultural and Pastoral Association	H. J. Cooper ...	18 Oct.	
North Isis ...	North Isis Canegrowers' Association	T. E. Barnes ...		
North Pine ...	Moreton Agricultural, Horticultural, and Industrial Association	D. McQ. Fraser ...	...	10 and 11 July
Oakey, <i>via</i> Eumundi	Kenilworth Farmers' Association ...	Thos. H. Gordon...		
Oakey ...	Oakey Agricultural and Pastoral Society	E. R. Pace ...		
Palmwoods ...	Palmwoods Industrial Fruitgrowers' Progress Association	H. Taylor ...		
Peachester, <i>via</i> Beerwah, N.C. Line	The Peachester Progress Association	W. Vieritz ...		
Pittsworth ...	Pittsworth Pastoral, Agricultural, and Horticultural Association	John J. Daniel, senr.	30 Jan.	29 Jan.
Pomona ...	Pomona Agricultural and Progress Association	H. J. Scott ...		
Port Douglas	Port Douglas and Mosman Pastoral, Agricultural, Horticultural, and Mining Association	H. McMahon ...	August (Date not fixed)	
Proserpine ...	Preston Farmers and Settlers' Association	T. Duval ...		
Proserpine ...	Preston Farmers and Canegrowers' Association	R. C. Dagg ...		
Proserpine ...	Cannon Valley and District Farmers' Progress Association	W. A. Compton ...		
Roadvale ...	Roadvale Progress Association ...	Henry Clark ...		
Rockhampton	Alton Downs Farmers' Association...	G. T. Crook ...		
Rockhampton	Central Queensland Farmers and Selectors' Association	T. Whitely, Coowonga		
Rockhampton	Central Queensland Stockowners' Association	R. R. Dawbarn ...		
Rockhampton	Rockhampton Agricultural Society...	A. C. Lyons ...	20, 21, and 22 June	11, 12, and 13 June
Roma ...	Western Pastoral and Agricultural Association of Queensland	Angus McPherson	16 and 17 July	
Roma ...	Yingerbay Farmers' Association ...	R. Frederick ...		
Roma (Blythedale)	Warooby Farmers' Association ...	Geo. Munt...		
Roma ...	Euthulla Farmers and Fruitgrowers' Association	J. Bates ...		
Roma ...	The United Maranoa Farmers' Association	R. Frederick, senr.		
Rosewood ...	Farmers' Club ...	P. H. Adams ...	29 and 30 May	15 and 16 July
Southport ...	Southport Horticultural Society ...	E. Fass ...		
Springsure ...	Queensland Pastoral Society...	G. R. Milliken ...		
Springsure ...	The Springsure Pastoral and Agricultural Society	H. E. Laver ...	...	30 April
Stanthorpe ...	Border Pastoral, Agricultural, and Mining Society	Geo. Simcocks ...	21 and 22 Feb.	20 and 21 Feb.

AGRICULTURAL AND HORTICULTURAL SOCIETIES—*continued.*

Postal Address.	Name of Society.	Name of Secretary.	Show Dates.	
			1907.	1908.
St. George ...	Balonne Pastoral and Agricultural Society	T. M. Cummings ...	7 and 8 May	
Sydney ...	Royal Agricultural Society of New South Wales	...	7, 8, 9, and 10 Aug.	
Takura (Pialba line)	Takura Farmers' Progress Association	S. E. Tooth ...		
Teutoberg ...	Teutoberg Farmers' Progress Association	E. M. Nothling ...		
Tinana ...	Tinana Fruitgrowers and Farmers' Association	H. G. Habler ...		
Tingoora ...	Tingoora Farmers' Progress Association	Arthur Boisen ...	6, 7, 8, and 9 Aug.	
Toowoomba...	Royal Agricultural Society of Queensland	G. A. Leichney ...		
Townsville ...	Townsville Pastoral, Agricultural, and Industrial Association (formerly North Queensland Pastoral and Agricultural Association)	J. N. Parkes ...	2 and 3 July	
Upper Kedron	Upper Kedron Fruitgrowers and Farmers' Association	A. Marshall ... A. Pickering ...		
Wallumbilla	Wallumbilla Farmers' Association ...	A. Budd ...		
Warren Siding	The Stanwell United District Farmers' Union	G. N. Terry ...		
Warwick ...	Eastern Downs Horticultural and Agricultural Association	F. H. Selke ...	12, 13, and 14 Feb.	
Wellington Point	Wellington Point Agricultural, Horticultural, and Industrial Association	Victor Drury ...	18 Sept.	
West Haldon, <i>via</i> Greenmount	West Haldon Farmers' Progress Association	A. E. Ayris ...		
Wondai ..	Mondure Farmers' Progress Association	S. R. Monteith ...		
Woolloom-gabba	Queensland Dairy Herdbook Society	Alfred Gorrie ...		
Woombye ...	Maroochy Pastoral, Agricultural, Horticultural, and Industrial Society	P. S. Hungerford...	...	15 and 16 July
Woombye ...	Woombye Fruitgrowers' and Progress Association	E. E. McNall ...		
Wooroolin ...	Wooroolin Farmers' Progress Association	A. Deighton ...		
Wooroolin (Memerambi Siding)	Memerambi Farmers' Progress Association	J. E. Reid ...		
Yandina ...	Yandina Agricultural and Progress Association	W. R. Brayden ...		
Yingerbay ...	United Farmers' Association of the Maranoa	R. Frederich ...		
Zillmere ...	Zillmere Horticultural Society ...	E. H. Decker ...		

Societies and associations desirous of being registered and placed on the above list must make application to that effect, and forward to the Under Secretary for Agriculture and Stock the following particulars:—

Number of members who have paid their subscriptions for 1907.

Number of meetings held by the Society during 1907.

Date of the last meeting.

Name of the Secretary for 1908.

Departmental Announcements.

The EDITOR will be glad to receive any papers of special merit which may be read at meetings of Agricultural and Pastoral Associations in Queensland, reserving, however, the right to decide whether their value and importance will justify their publication.

Secretaries of Associations are requested to be good enough to forward to the EDITOR, as early as possible, the dates of forthcoming Shows, as it is important in the interests of the Associations that these dates should be published.

To enable recipients of the *Queensland Agricultural Journal* to have the half-yearly volume bound, covers in boards and cloth will be supplied from this office on application to the Under Secretary for Agriculture and Stock. Applications must be accompanied by a remittance of SIXPENCE to cover cost. For the convenience of those who are not within reach of a bookbinder, a Special Cover has been designed, which obviates the necessity for binding. These covers will be supplied at ONE SHILLING each.

In order to avoid disappointment, correspondents who wish for replies to questions in the *Journal* are requested to note that it is imperative that all matter for publication on the first day of any month should reach the Editor by the 15th of the previous month.

For the information of those who are desirous of communicating with the managers of State farms, we give their names and addresses below:—Queensland Agricultural College, Gatton, principal, J. Mahon; Westbrook State Farm, Westbrook, manager, C. Ross; Biggenden State Farm, Biggenden, manager, D. Macpherson; Hermitage State Farm, Warwick, manager, John Liverseed; Gindie State Farm, manager, R. Jarrott; Kamerunga State Nursery, Cairns, manager, Howard Newport; Roma State Farm, manager, R. Soutter; Botanic Gardens, director, J. F. Bailey.

It is notified, for the information of intending Visitors to the Queensland Agricultural College, that the Second Wednesday in each month has been set apart for the reception of Parties of Farmers and others desirous of inspecting the Institution. Supplies of hot water and milk can be obtained at the College, if desired.

NOTICE OF SHOW DATES.

We wish to draw the attention of Secretaries of Agricultural and Pastoral Societies and Associations to the importance of promptly notifying the Editor of any change in the dates on which shows are to be held.

THE BOUNTIES ACT.

The Department of Agriculture and Stock have received from the Comptroller-General of Customs, Melbourne, a number of copies of "Memorandum for Information of Growers" and "Form of Notice of Intention to Claim Bounty" under the Commonwealth Bounties Act. Should any grower desire a copy of either the above, same will be supplied upon application to the Under Secretary, Department of Agriculture and Stock, Brisbane.

"QUEENSLAND AGRICULTURAL JOURNAL."—GENERAL INDEX, VOLS. I. TO XIX.

The GENERAL INDEX may be obtained on application to the Under Secretary, Department of Agriculture and Stock. Price: ONE SHILLING.

DISEASES OF ANIMALS.—EXAMINATION OF SPECIMENS.

In accordance with an Order recently issued by the Minister for Agriculture, any persons deriving their principal means of livelihood from rural pursuits may have specimens, &c., examined by the Bacteriological Department free of charge. The Principal Veterinary Surgeon and Bacteriologist will, therefore, be glad at any time to make examination and report upon pathological specimens, &c., in connection with diseases of animals. When forwarding material, full particulars of the case should be given. The specimens should, where possible, be wrapped in a cloth saturated with disinfectant before placing in the receptacle, securely packed, and forwarded with the history thereof, carriage prepaid, as quickly as possible to the Department of Agriculture, Brisbane.

(Signed) S. DODD,
Principal Veterinary Surgeon and Bacteriologist.

QUEENSLAND AGRICULTURAL COLLEGE. FOR SALE.

PURE-BRED PIGS, all from imported stock, including Berkshire and Large and Middle Yorkshires. BOARS, 2 GUINEAS; SOWS, 1 GUINEA each; f.o.b. Gatton.

Poultry of the following breeds:—Brown Leghorns, Silver-grey Dorkings, Old English Spangled Game, Plymouth Rocks, Minorcas, White Wyandottes, Silver-laced Wyandottes, Black Orpingtons, Buff Orpingtons, White Leghorns. Prices, from 10s. each, f.o.b. Gatton.

Eggs of the above breeds are available in the season—1st July to 31st December; and nine out of each setting are guaranteed fertile. Should less than nine prove to be fertile, the infertiles will be replaced if returned carriage paid. This rule will be strictly adhered to. Price, 10s. per setting, for all breeds, f.o.b. Gatton.

Applications for Setting of Eggs, accompanied by Remittance, may be made to the Principal, Queensland Agricultural College.

A few Settings of American Bronze-wing Turkey Eggs will be available at 15s. per setting, f.o.b. Gatton.

As it has been decided that all surplus stock is to be disposed of by auction sales to be held annually, no pure-bred bulls will be available for private sale.

The following Stud Animals are available for Service at the College Farm, at a charge of 10s. for pure-bred and 5s. for grade cows:—Imported Shorthorn, Jersey, Holstein, and Guernsey Bulls.

The following Bulls imported from Great Britain are also available for Service at a charge of 10s. for all cows:—

Ayrshire Bull, SPECULATION.
Shorthorn Bull, BURTON SPOT.

Sows may be served also by imported Berkshire, British Large Black, and Yorkshire Pigs, at a charge of 5s. for each service.

Paspalum Roots will be supplied to purchasers at 2s. 6d. per sack, f.o.b. Gatton. Applicants will be supplied on receipt of remittance to the amount of the order.

Small quantities of Roots of the following Grasses will also be available for disposal:—Rhodes Grass, Wonder Grass.

Seeds for Sale:—Cowpea, Sunflower, Sorghums, Panicum.

JOHN MAHON, Principal.

QUEENSLAND AGRICULTURAL COLLEGE.

The College, which is situated within 4 miles of Gatton and 1 mile from the College Railway Siding, comprises 1,692 acres, and the buildings can accommodate 60 Students.

TERMS.

TWENTY-SEVEN POUNDS per annum, paid half-yearly in advance. Students are also charged One Pound per annum each for medical attendance, the sports fund, and for guarantee fee.

The course of instruction includes PRACTICAL AGRICULTURE in all its branches, DAIRYING, GARDENING, STOCK-BREEDING, and MECHANICAL ARTS. Classes are also held daily for THEORETICAL INSTRUCTION in these branches, as well as in SURVEYING, CHEMISTRY, &c.

The College Calendar, giving full particulars, may be obtained on application to the Principal at the College, or to the Under Secretary for Agriculture and Stock, Brisbane.

BURSARIES.

Four bursaries are given annually. An examination for these is held in June or July of each year. Bursaries will be awarded upon the following conditions:—Candidates (males) to be from sixteen to eighteen years of age, of sound constitution, and in good health; they must have resided in the State for the two years immediately preceding the time of their examination for such bursary, or their parents must have resided in the State three years immediately preceding such examination. The bursar is entitled—subject to good behaviour and the pleasure of Parliament—to free board and instruction as a resident student for a period of three years. He is required to take up his residence at the College within one month of the publication of the results of the examination; otherwise he forfeits his right to a bursary.

The AGE of CANDIDATES for Admission to the College as Students is Sixteen Years.

HERMITAGE STATE FARM.

FOR SALE.

PURE-BRED MIDDLE YORKSHIRE BOARS (Progeny of Imported Stock), £2 2s. each on rail at Hermitage.

TURKEY GOBBLERS, 11 months old, THIRTY SHILLINGS each on rail at Hermitage.

FOR SERVICE—

Middle Yorkshire Boar, HOLYWELL CHUB (Imported)

Berkshire Boar, YOUNG BOOMERANG (Imported).

Full particulars on application to THE MANAGER, State Farm, Hermitage.

STATE FARM, WESTBROOK.

GRAPE CUTTINGS.

Over 50,000 for distribution, including 150 VARIETIES, at the following rates:—

Wine varieties, 15s. per 1,000; less quantities, 3s. per 100.

Table varieties, £1 per 1,000; less quantities, 4s. per 100.

All prices f.o.b. at Westbrook.

Application should be made direct to the MANAGER, State Farm, Westbrook, before 25th JULY, accompanied by a Remittance to cover Cost of Cuttings; and where delivery is to be taken at Prepaid Stations, the cost of Freight must be added.

Applicants should state where delivery is to be taken.

GRAPE CUTTINGS may also be obtained at the same prices from the ROMA STATE FARM, at BUNGEWORGORAI, on application to the Manager.

CANARY GRASS

(*Phalaris commutata*).

This is the best all-the-year-round grass as yet introduced for Green Cutting, Hay, or Feeding-off. Planting should be done during the Winter and Early Spring, before hot dry weather sets in. It is particularly luxuriant in winter, and behaves remarkably well during the hot dry months. The Manager believes it will flourish in any part of the Commonwealth.

Rootlings: Two SHILLINGS AND SIXPENCE per Dozen, or TWELVE SHILLINGS per 100.

Seed is now ready for distribution. Price, £1 1s. per lb., or 1s. and 2s. 6d packet, Post Free.

To expedite delivery, application should be made direct to the MANAGER, Westbrook State Farm, together with remittance to cover the cost of Rootlets and Freight.

STATE SCHOOLS will be supplied with Small Parcels of Rootlings of the above FREE OF CHARGE.

Applications, however, must include cost of freight.

POULTRY.

GOLDEN WYANDOTTE COCKERELS, from Heavy Laying Strains, FOR SALE. Price: SEVEN SHILLINGS AND SIXPENCE each. Apply to

THE MANAGER.

PURCHASE OF STOCK AND PRODUCE FROM THE DEPARTMENT OF AGRICULTURE

—:O:—

Purchasers of Stock and Produce, Plants, Seed, &c., from the State Farms and Agricultural College are reminded that Sales from these Institutions are made for Cash only. Persons desirous of making purchases should, therefore, first ascertain the cost of whatever articles they desire to obtain, and remit the full purchase-money when sending an order.

STATE NURSERY, KAMERUNGA, CAIRNS.

RUBBER, COCOA, KOLA-NUT, CAROB BEAN, KAPOCK, VANILLA, CARDAMOM, BREADFRUIT, DIVI-DIVI, GINGER, AND OTHER VALUABLE TROPICAL ECONOMIC PLANTS FOR SALE, AT NOMINAL RATES, TO SETTLERS AND FARMERS.

The Instructor in Tropical Agriculture notifies that PLANTS or SEEDS of the above useful and valuable AUXILIARY PRODUCTS may be obtained by application to the Manager, Kamerunga State Nursery. PLANTS available at any time. SEEDS when in season, BEING MOSTLY OF SHORT VITALITY, should be promptly applied for.

RUBBERS, KAPOCK, CARDAMOM, and especially rare Plants, or Seedlings difficult to raise, 1s. each, or 10s. per dozen; others, 6d. each, or 5s. per dozen. Seed, 6d. per packet. Plus packing, railage, or postage.

Remittances should accompany applications.

Lists of Tropical Economic Plants available may be obtained on application to the Manager, Kamerunga State Nursery, Cairns, North Queensland.

RUBBER SEEDS AND PLANTS.

Variety and Name.	Plants or Seed.	When Available.	Price.
Rambong or Assam (<i>Ficus elastica</i>)	Plants only	Any time ...	1s. each, 10s. per doz.
Para Rubber (<i>Hevea braziliensis</i>) }	Plants ...	„ „ ...	3d. each
„ „ „ „ }	Seed ...	Feb. to April	1s. per oz. (about 1 doz.
Central American (<i>Castilloa elastica</i>)	Plants ...	Any time ...	6d. each, 5s. per doz.
„ „ „ „	Seed ...	Nov. to Jan.	1s. per oz. (about 100)
Iré or Logos Rubber (<i>Funtumia elastica</i>)	Plants only	Any time ...	1s. each, 12s. per doz.
Ceara Rubber (<i>Manihot Glaziovii</i>)	Seed only	, , ...	1s. per oz. (about 50)
West African Rubber (<i>Tabernæmontana</i>)	Plants ...	„ „ ...	6d. each, 5s. per doz.
„ „ „ (<i>Crassa</i>)	Seed ...	„ „ ...	1s. per oz. (about 150)

Above prices are for delivery on the Nursery. If applicants wish Plants or Seed sent, packing, postages, railage to port, &c., are extra. Seed and small quantities of Plants may be sent by parcels post at purchaser's risk. Plants, being delicate, do not travel well by post.

Hessian-covered cases, holding one to three dozen, cost 4s. 6d. extra f.o.b. Cairns, whence they will be shipped "freight on." The demand for Seed being large and the supply limited, Orders received, with remittance, will be booked and completed as soon as Seed is available.

* Owing to the limited supply of plants and seed available at the Nursery, settlers requiring large numbers may, by special arrangement of the Department, import in quantity from Singapore or elsewhere. See conditions attached.

CONDITIONS UNDER WHICH RUBBER SEEDS OR PLANTS MAY BE
IMPORTED INTO QUEENSLAND FROM SINGAPORE.

1. The Department of Agriculture and Stock, Brisbane, to be notified of intending importations.
2. The importer to give an undertaking that the seeds or plants shall, for at least three months after arrival in Queensland, remain in a place approved by the Department of Agriculture and Stock and be subject to such treatment as the Department may require.
3. No imported rubber seeds or plants are to be placed within one mile of a coffee-tree during the time of quarantine.
4. Seeds or plants imported from Singapore are to be accompanied by a certificate to the effect that they have been packed under the supervision of the Director of the Botanic Gardens, Singapore, and are quite free from disease.

Department of Agriculture and Stock,
Brisbane, 6th August, 1907.

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IMPORTS OF FRUIT, Etc., INTO VICTORIA.

The following Regulations relating to the importation of fruit, plants, trees, &c., into the State of Victoria have been promulgated by the Victorian Minister for Agriculture:—

1. Inspectors are authorised and required to charge the following fees and expenses for examining citrus fruits imported, introduced, or brought into Victoria:—

For each case or package not exceeding one bushel in capacity, One halfpenny.

The inspection fee for bananas is now 1d. per bunch or case.

For each case or package exceeding one bushel in capacity, One penny.

2. Such fees and expenses shall be paid by the owner or the person in possession to the inspector.

IMPORTATION OF FRUIT OR PLANTS INTO NEW ZEALAND.

(Extract from the "New Zealand Gazette" of 27th February, 1908.)

By an Order in Council, gazetted on the 20th February, 1908, the New Zealand Government have revoked all previous Proclamations and Orders in Council, dated respectively from 6th July, 1897, to 22nd January, 1908, referring to the importations into New Zealand of grape vines—rooted and cuttings—fruit infested with Queensland fruit fly, scale-infested plants and fruit, or with apple scab or black spot, or potatoes infested with Irish blight, or potato moth.

The new regulations declare that the only ports of entry for fruit or plants are—for fruit only, Bluff; for fruit and plants, Auckland, Wellington, Christchurch, Dunedin. They also provide for the inspection of fruit on arrival at the above ports, and for fumigation or destruction of shipments unaccompanied by a certificate signed by the shipper, and another signed by an officer of the Department of Agriculture of the State where the fruit was grown, certifying that the fruit is clean and free from disease. Full particulars will be found by anyone interested in shipping fruit to New Zealand in the "New Zealand Gazette" of 27th February, 1908.



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